# FLORA

OF

BRITISH INDIA.

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ASSISTED BY VARIOUS BOTANISTS.

#### VOL VII

CYPERACE, E. GRAMING E'AND GENERAL INDEX

PUBLISHED UNDER THE AUTHORITY OF THE SECRETARY OF STATE FOR INDIA IN COUNCIL.



LONDON:

L. REEVE & CO.

PUBLISHERS TO THE HOME, COLONIAL, AND INDIAN GOVERNMENTS.
6, HENRIETTA STREET, COVENT GARDEN

1897.

LONDON

PRINTED BY GILBERT AND RIVINGION, LD

ST. JOHN'S HOUSE, CLERKENWALL, & C.

# PREFACE TO VOL. VII.

THE length of time, upwards of a quarter of a century, occupied in the publication of the Flora of British India, has resulted in the later volumes containing a far more complete account of the families of plants to which they are devoted than do the earlier volumes of theirs.

For this there are two reasons, the extension of the area of British India in the interval, and the many collections that have been transmitted to Kew from wholly or imperfectly explored regions of India during the same interval.

The extension of area has been: on the East, Munnepore, and by far the greater part of Burma, adding many Indo-Chinese genera and species to the flora; on the West, British Beluchistan and other trans-Indus hills and valleys, adding Oriental genera and species. Neither of these extensions have, however, added so much to the Indian flora as might have been expected; for, as regards Burma, extensive materials were already available from Pegu, Martaban, Tenasserim, and the upper and lower Irawaddy valleys; and as regards the West, the low country Oriental flora is represented in the plants of Sind and the Panjab, and the upland and alpine in the trans-Indus valleys, Western Tibet, and the Kashinir Himalaya.

On the other hand, the collections received from previously unexplored and partially explored regions of India proper have been numerous and full of novelty and interest. Of these the first in importance are Mr. C. B. Clarke's, whether for their extent, the knowledge and judgment with which the specimens were selected, ticketed, and preserved, or for the valuable observations which accompany them. They were obtained ever a greater extent of India than had been traversed by any other Indian botanist, and at all elevations, up to 18,500 ft., from the bend of the Indus at Gilgit, Kashmir, and Western

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Thet, in the extreme West; from Sikkim, Bengal, Assam, and Munnepore in the East; from Behar, Central India, and Chota Nagpur in the centre; and from the Nilghiri Hills in the South. Next in importance are the Malay Peninsula collections made by Father Scortechini, the Messrs. Curtis, Wray, Hervey, Hullett, Merton, and Ridley, and by collectors sent by Dr. King from the Botanic Gardens of Calcutta. These latter have added several hundred species to the genera described in the first volume alone of this Flora, and have been published by Dr. King in the Journal of the Asiatic Society of Bengal Thirdly rank Mr. Duthie's copious and excellently preserved collections made in Kashmir, Western Tibet, Garwhal, Kumaon, Rohilkund, Rajmahal, and Central India, and Dr. Aitchison's from the Kurrum and other valleys west of the Indus.

Of the works upon Indian Botany that have appeared during the publication of Flora of the British India, the more important are Mr. C. B. Clarke's "Compositæ Indica" (1876); Mr. Kurz's "Forest Flora of Burma" (1876); Dr. Brandis' "Forest Flora of N.-W. and Central India" (1874); Col. Beddome's "Flora Sylvatica of Southern India," vols. i. and ii. (1869-73), and his "Icones Plantarum Indiae Orientalis," vol. i. (1874); Dr. Trimen's "Handbook of the Ceylon Flora," Parts i.—iii. (1893-5); and Dr. King's "Annals of the Botanic Gardens, Calcutta," vols. i.—vii. (1888-1897), which include illustrated monographs by himself and other Indian botanists of the Indian species of Ficus, Quercus, Pedicularis, Magnoliucea, Anonacea, Bambusæ, &c.

In the Preface to the first volume of this work I have stated that it was proposed to include in it the Ferns and their allies. This intention has been abandoned, owing to the appearance of excellent available works describing the Indian species, especially Hooker and Baker's "Synopsis Filicum" (1874); Col. Beddome's "Review of the Ferns of N.-W. India" (1880), and his "Handbook of the Ferns of British India" (1883), with Supplement (1892)

Having regard to this "Flora of British India," I must remind those who may use it that it has no pretensions to give full characters of the genera and species contained in it. It aims at no more than being an attempt to sweep together and systematize within a reasonable time and dompass, a century of hitherto undigested materials scattered through a library of botanical books and monographs, and preserved in vast collections, many of which latter had lain unexamined for half a

century in the cellars of the India House and in public and private herbaria. It is a pioneer work, which, besides enabling botanists to name with some accuracy a host of Indian plants, may, I hope, serve two higher purposes, to facilitate the compilation of local Indian floras and monographs of the large Indian genera; and to enable the phytographer to discuss the problems of the distribution of plants from the point of view of what is perhaps the richest, and is certainly the most varied botanical area on the surface of the globe, and one which, in a greater degree than any other, contains representatives of the floras of both the Eastern and Western Hemispheres.

J. D. HOOKER.

November, 1897.

# ADDENDUM.

Vol. vii. p. 416, under 2. S. chilianthum, insert habitats:

Singapore, Wallach; Malacca, Stevens DISTRIR; Java, Sumatra.

# FLORA OF BRITISH INDIA.

#### ORDER CLXXIII. GRAMINEH.

ERECT decumbent or creeping herbs, or in Tribe Bambuseæ shrubs or trees. Stem terete or compressed, jointed; internodes solid or hollow. Leaves simple, usually long and narrow, entire, parallel-nerved, with a sheathing base distinct from the blade; sheath split to the base (very rarely entire) with often a transverse hyaline erect appendage (ligula) at the union with the blade, facing the latter. Inflorescence terminal, rarely also from the upper sheaths, consisting of spicate racemed capitate or panicled spikelets. Spikelets of three or more alternate distichous bracts (glumes), of which the two lowest are normally empty, and the succeeding. if more than one, are arranged on an axis (rachilla), and are all or some of them flowering; within each flowering glume and opposite to it is an erect narrow 2-nerved scale (palea), the margins of which are infolded towards the glume and enclose at the base the true flower. Flowers uni- or bisexual, consisting of 2, rarely 3 or 6 microscopic scales (lodicules) representing a persanth, and stamens or a pistil, or both. Stamens 3, rarely 1,2,6, or very rarely many, hypogynous; filaments capillary; anthers versatile, fugacious, of two parallel cells, with no apparent connective; pollen globose Ovary entire, 1-celled; styles 2, rarely 3, free or united at the base, usually elongate, and exserted from the sides or top of the spikelets, clothed with simple or branched stigmatic hairs; ovule erect, anatropous. Fruit a seed-like utricle (grain) free within the fig. glume and palea, or adherent to either or both; pericarp very thin, rarely thick or separable from the seed. Seed erect; albumen copious, mealy; embryo minute, at the base of and outside the albumen; cotyledon scutelliform, bearing on its face an erect conical plumule, and descending conical radicle.

Genera about 300; species estimated at about 3000, but many are doubtful, and

more mere varieties; natives of all climates and regions.

In working up the grasses for this Flora, I find the multiplication of species to have passed all bounds, and their nomenclature to be involved in a corresponding degree. This has arisen from two principal causes, from authors not taking into account the wide area over which the individual species of grasses range,\* and from the imperfection of the descriptions of the earlier and many later authors. It is sixty-two years since Kunth published his "Agrostographia Synoptica (Tubingen, 1833), which is an uncritical sweeping up of all previously known supposed genera and species, with imperfect descriptions and synonyms. It was succeeded (in 1835) by a second volume, in which a few hundred species of the first volume are very fully and accurately described, and valuable notes upon others are added. In 1855 Steudel's "Synopsis Graminum" appeared. It in no respect advances, and in many ways retards the student of the Order. Of more recent works on Gramines, three only are of great mark, namely, Munro's very able Monograph of the Bambuses (Trans. Linn. Soc. vol. xxvi. (1868); Bentham's revision of the genera, Gen. Plant. vol. iii.

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<sup>\*</sup> It is a fact familiar to every one who examines collections of plants from hitherto unexplored countries, that hovelties amongst the grasses are very few indeed, compared with what occurs in other natural families.

(1883), a work of remarkable completeness and accuracy, considering the chaotic condition in which the author found the Order; and Hackel's admirable monograph of the Andropogoneæ in A. de Candolle "Monogr. Phanerog." vol. vi. (1889), the

largest and most difficult Tribe of grasses.

I have cited synonyms to a much greater extent in this than in any other Order described in the "Flora of British India" (except the "Cyperaceæ" by Clarke) with the view of aiding the researches of future authors. Many of these synonims had never been fixed with any approach to exactness, and many were for the first time identified during Mr. Jackson's and my labours on the "Index Kewensis." I cannot expect that all will prove to have been satisfactorily reduced, and still less

that all have been brought to light.

Referring to the classification of the Indian genera, I have been compelled to diverge somewhat from Bentham's arrangement, and to abundon some of his Tribes and Subtribes, in many cases following Hackel's more recent and well-considered views. These divisions throughout the Order are of very unequal value, and are as difficult of delimitation as of definition upon any fixed principles. They are, indeed, in some cases arbitrary, and in others more or less artificial. In this matter, and in the description or revision of some of the very difficult genera, I have derived great aid from Dr. Stapf, Assistant in the Herbarium of the Royal Gardens, who has Intely been instructed by the Director of Kew to study and name the materials in that Herbarium critically. As Dr. Stapf shares my views as to the wide ranges of the species, and the undue multiplication of their synonyms, his labours may be expected to yield far-reaching results, taxonomic, morphological and geographical, and to modify some of the conclusions arrived at in the following attempt to methodize the Indian Grammere. As affecting the numbers and synonyms taken from" Wullich's List." I have to observe that for some of them I have had to depend on the ticketed duplicates in Herb. Hook, and Benth., the types being wanting in the Wallichian collection in the rooms of the Linnman Society.

Series A. Panicaceæ. Spikelets articulate on their pedicels, or deciduous with them, 1-2-fld., upper fl. alone (if 2) fruiting.

Exceptions. Spikelets inarticulate on their pedicels in Arundinella and Isachne. Spikelets articulate on their pedicels, or with articulate pedicels occur in Poucee, in Alopecurus, Cyathopus, Polypogon, Fingerhuthia, and Lophatherum. Upper flower alone fertile in Tribe Phalaridea of Poacea, and in Tristachya.

I. Rachis of infl. inarticulate, or subarticulate in Stenotuphrum. gl. usually corraceous or herbaceous.

Spikelets 2-fld., upper fl. bisexual, lower male or Tribe I. PANICEÆ neuter, rarely both fertile. (Spinifex is directions.)

- \* Spikelets articulate on their pedicels, except Isachne and Arundinella.
- + Spikelets not involucellate by bristles

§ Spikelets not awned (gl. II and III beaked or awned in Pan. Crus-yalli). (See also Tricholæna and Arundinella.)

Spikelets dorsally flattened, base not thickened; gls. 3, with very rarely a minute fourth (lowest). Spikelets of Paspalum, but with a thickened basal callus.

Spikelets subglobose, panicled; gls. 4, I and II separately deciduous, subequal

Spikelets panicled or spicate, gls. 4 (2 in P. subeglume) I and II very rarely subequal, II and III awned in P. Crus-galls, IV sarely very shortly awned

Spikelets of Panicum, but gl. IV. narrowed into a short, flattened stipes, or with 2 appendages near the base . Spikelets innumerable, very minute, harry, densely crowded in the capillary branches of a very large

- PASPALUM. 2. ERIOCHLOA.
- 3. ISACHNE.
- 4. PANICUM.
- ICHNANTHUS.
- 6. THYSANOLÆNA.

Spikelets panicled, branches of panicle produced beyond the uppermost spikelets; gl I minute, hyaline

Spikelets 2-seriate on a flat subarticulate rachis

Spikelets (at least the fertile) 1-seriate on an inarticulate flat rachis, the base of which dilates and encloses a

Involuced of spines connate at the base .

++ Spikelets not involucelled.

fruiting spikelet

7. CHAMÆRAPHIS.

14. PENNISETUM.

16. STENOTAPHRUM.

15 CENCHRUS.

17. THUAREA.

Diœcious, male spikelets in clustered spikes, fem. solu	
tary.  §§ Sprkelets awned, except in some sp. of Trucholum and Arundynella.	. 8. SPINIFEX.
Spikelets of Pancum, but nerves of gl. II broadl	v
fimbriate, and palea of III deeply cleft, IV awne	
Spikelets silky; gl. I 0, or minute and distant from I	
and III with usually capillary awns	. 10 TRICHOLENA.
Spikelets solitary or fascicled on a simple rachis or the	
branches of a panicle; gl. I long awned	. 11. OPLISMENUS.
Spikelets persistent on the pedi els, or gls. I and II sepa	
rately deciduous, IV deciduous; usually awned, aw	
bent	. 12. ARUNDINELLA.
†† Spikelets each surrounded by an involucel of bristles	. 13. SETARIA.
** Spikelets persistent on their pedicels, at least t	
their pedicels.	,
† Sprkelets in involucelled deciduous fascicles.	
	7.4 70

Tribe II. ORYZEE. Spikelets 1-fld, articulate on their pedicels and deciduous from them. Palea 1-3-nerved. Stumens 6 or fewer.

Tribe III. ZOYSIEE. Spikelets 1-fld., deciduous with their pedicels, 2-sexual, or some imperfect.

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* Spikelets fascicled.

Spikes geminate; fascicles unilateral
Spikes solitary; fascicles quaquaversal; gl. III echinate

** Spikelets solitary, rarely 2-nate.

Racemes slender; pedicels flattened; gl. I and II municate

Raceme slender; spikelets minute, base of gl. I saccate

Spike very slender; spikelets narrow; gl. I and II
awned

Spike rigid; spikelets appressed to the rachis, not awned.

22. Teachys.

23. Teagus.

24. Lattipes.

25. Lopholefis.

Spike very slender; spikelets narrow; gl. I and II
awned

Spike rigid; spikelets appressed to the rachis, not awned.

27. Zoysia.
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II. Rachis of inflorescence usually articulate.

Tribe IV. Androposone. Spikelets usually 2-nate, or the terminal in the infl. 3-nate, pairs home- or heterogamous. Fl. gl. smaller than the empty, hyaline, often awned or reduced to an awn.

Subtribe I. MAYDEM. Spikelets spicate, all 1-sexual; male spikes in terminal panicles, or continuous with the fem spike.

Fruiting spikelets enclosed in a stony, nut-like polished
Fruiting spikelets, having all the inner gl. concealed within the greatly enlarged bardened outer 29. POLYTOCA.
Fruiting spikelets densely crowded on a cylindric spongy rachis, grain exposed
G 3   1 TT Down G 7 7 1   1   1   1   1   1   1   1   1
Subtribe II. Dimeries Spilelets homogamous, secund on a slender inarticulate rachis, 1-fld., diandrous 30 Dimeria.
Subtribe III. Sacchare. Spikelets homogamous, in compound racemes or panicles (except Pollinia); gl. I not sunk in a hollow of the rachis.
* Raches not or rarely fragile.
Spikelets in a cylindric silvery thyrsus, 1-fld., not awned. 31 IMPERATA. Spikelets panicled, 2-nate, 1-fld., awned
** Rachus fragule.
Spikelets in panicled racemes, 2-fid., awned 33. Spodiopogon.
Spikelets in geminate digitate or fascicled spikes 34. POLLINIA.
Spikelets in a thyrsus of spiciform racemes, 1-fld., awnless 35. SACCHARUM.
'pikelets in a thyrsus of spiciform racemes, 1-fld, awned. 36. ERIANTHUS.
Subtribe IV. ISCHEMEE. Spikelets many, in solitary digitate or fascicled spikes, usually heteromorphous, gl. I not sunk in a hollow of the rachis. (See Pollinia in Sarchureæ; Vossia in Rottboellieæ.)
* Margins of ql. I of sessile spikelet inflexed.
Spikes rarely solitary; spikelets 2-nate, 2-fld., awned . 37 Ischmum.
Spikes solitary; spikelets 1-fid., gl. I pectinate 38. Eremochioa.
** Margins of gl. I of sessile spikelet not inflexed.
Spikes solitary; spikelets 2-nate, 1-2-fld, 2-awned. 39. POGONATHERUM. Spikes solitary or 2-nate; spikelets 2-fld., diandrous; gl.
I very broad, truncate 40. APOCOPIS.
Spikes 2-nate or digitate; spikelets 1-fld 41. ARTHRAXON
Spikes digitate; spikelets 2-fld, gl. I tubercled 42. Thelepogon.
Spikes 2-∞-nate; spikelets 2-nate, upper alone awned . 43. Lorнorogon.
Subtribe V. Apludez. Spikelets 3 on an in-
Subtribe VI. ROTTBOEILIEM. Spikele's homo- or hetero-gamous, 1-2-fld, solitary, or 2-rarely 3-nate on the internodes of an articulate spike or raceme, not awned (gl. I caudate in Vossia); gl. I not keeled, adnate to or sunk in a depression formed by the internode and pedicel of the
upper spikelet; gls. of sessile spikelet 4.
Spikelets 2-nate, gl. I caudate 45. Vossia.
Spikelets 2-unte, gl. I flat
Spikelets 2-nate, gl. I globose
Spikelets solitary, gl. I convex
Subtribe VII. RATZEBURGIEÆ. Spikelets homo-
gamons, 3-nate on the slender internodes of a
solitary flattened fragile spike, two perfect, 1-fld.,
third imperfect; gls. 4 49. RATZEBURGIA.
Subtribe VIII Energopocorna Suitatala betanna 1970
Subtribe VIII. EUANDROPOGONEA. Spikelets heterogamous, 1-fld., 2-
rarely 3-nate on the whorled articulate branches of simple or compound
racemes or panicles (solitary in Cleistachne). gls. 4, I not keeled, IV
usually awned.

Spikelets 2-3-nate, in a simple spike, gl. I with tuber-		
cled penicillate ribs	50.	ELIONURUS.
Spikelets solitary, terminating the branches of a thyrsoid		
panicle	51.	CLRISTACHNE.
Spikelets capitate, male sessile, 2-fld., forming an involu-		•
criform whorl round the pedicelled fem.	52.	GERMAINIA.
Spikelets 2-nate, or the uppermost 3-nate, spicate, or panicled	53	ANDROPOGON.
Spikelets in 2 superposed series; upper series of hetero-	00	ANDROFOGON.
gamous pairs, and a terminal male, lower a whorl of		
4 persistent males or neuters	54	ANTHISTIRIA.
Spikelets as in Anthistiria, but male and neuter spikelets		
deciduous with the fem.; callus 0	55	Iseilema.

Series B. **Poaceæ.** Spikelets continuous (not articulate with) their pedicels, 1- many-fld, rachilla articulate at the base, and often between the flg. gls.; lowest fl. always fruiting, upper often male or neuter.

Exceptions. Upper fl alone bisexual in Phalarideæ. Spikelets articulate on their pedicels, or gl 1 and II separately deciduous occur in Alopeourus, Melsoa, Fingerhuthia, Cyathopus, and Spharocalyon.—See under Panicaceæ some genera with spikelets inarticulate at the base.

Tribe V. Phalabides. Spikelets with a terminal perfect fl., and one or more imperfect male or neuter below it; rachilla not produced beyond the perfect fl.

Subtribe VI. Agrostides. Spikelets 1-fid.; rachilla jointed at the base, produced or not beyond the fig. gl.; gls. 3, I and II empty, III fig. awned.

Exceptions. Spikelets sometimes 2-fld. in Sporobolus and Muchlenbergia.

Subtribe I. STIPEE. Spikelets panicled; rachilla not produced beyond gl. III; fl. gl. rigid or hard, awned (except Milium).

Subtribe II. Phieoides. Spikelets in spiciform or subspiciform panicles, gl. III hyaline, loosely wrapping the grain; stigmas exserted from the top of the spikelet.

Subtribe III. EUAGROSTEE. Spikelets usually small, in open or contracted many-fid. panicles; gls. usually thin or membranous; stigmas laterally exserted from the spikelet. Spikelets rarely 2-fid. in Sporololus and Muehlenbergia.

Charle disalitable (0. 2. Hooker)
* Rachilla not produced beyond gl. II.  † Spikelets acticulate on their pedicels, or gl. I and II separately deciduous, or pedicel articulate in the middle.  Spikelets oblong; gl. I and II 3-nerved, III 5-nerved, awaless
Spikelets very narrow; gl. I and II 3-nerved, III faintly 1-3-nerved, usually awned 68. Garnotia. Spikelets compressed; gl. I and II subequal, awned,
nerved
nerved, awnless
Gl. all awnless; I and II 1-nerved, pericarp of grain loose
(il. I and II subequal, 1-nerved, awnless, awn of III dorsal or 0
Gl. I and II unequal, awnless, 1-nerved, awn of III terminal
with long hairs
ciliate with long, silky hairs; gl. I and II 3-nerved 75. DEVEUXIA.
Tribe VII. ANENEE. Spikelets 2- or more fid., panicled, very rarely spicate, or panicle subspiciform; fl. gls. usually awned, awn geniculate and often twisted, rarely straight or 0; rachilla produced or not beyond the upper fl. gl.
Subtribe I. AIREE. Spikelets 2-fld.; gls. membranous; rachilla not produced.
Gl. I acuts, many-nerved; fl. gl. long-ciliate
Subtribe III. EUAVENEE. Spikelets 2- or more fid.: rachilla pro-
Spikelets 2-fid., both bisexual, awned
Spikelets 2-fld., lower fl. bisexual awnless, upper male or neuter awned
Spikelets 3- or more-fid.; fl. gl. deeply cleft, awned in
Tribe VIII. CHLORIDER. Snikelets 1. or more 43. O
form branches of a slender panicle; fl. all or the lower only bisexual; rachilla produced or not beyond the upper fl. gl.  * Spike solutary, terminal (see also Chloris).
Spikelets minute, 1-fid., awuless  Spikelets 1-2-fid., in pedicelled deciduous articulate clusters, awned.  85. Changes
Spikelets 1-2 fld, in sessile inarticulate clusters, awned . 86. Enteropogon.  Spikelets many-fld.; fl. gl. 3-awned . 87. Tripogon.

,
** Spikes or spiciform branches digitate, racemed or panicled (or solitary in Chloris).
Spikes digitate, 1-fld., upper imperfect fl 0 88. Cynodon. Spikes solitary, spicate or racemed; spikelets 2- or more-
fid., upper fl. imperfect 89. Chloris. Spikes digitate or whorled; spikelets 3-6-fid., densely
crowded, awnless
awned 91. DINEBRA. Spikes panicled, filiform; spikelets very minute, alternate,
1- or more fid., awnless
very few, distant, 1-fld., awned 93. DICHETARIA.
Tribe IX. Festucace. Spikelets 2- or more-fid., pedicelled, rarely sessile, in effuse or contracted rarely spiciform, panicles; rachilla articulate at the base and often at the base of the fl. gls, always produced beyond the uppermost fl. gl.
Subtribe I. Pappophore. Spikelets few- or many-fid.; gls. many-nerved, fl. gls. many-awned or 4-5-lobed.
Spikelets spicate, 2-5-fld.; empty gls. 4, 2 upper and flg. 4-lobed; fl. gl. with a dorsal awn
Subtribe II. Arundiner. Spikelets panieled, 2-many-fid.; gls. very narrow, fig. penicillate with long silky hairs on the callus or sides or both, lowest fl. gl. sometimes male or neuter.
Rachilla elongate, glabrous; fl. gl. silkıly hairy
Subtribe III. Sesieries. Spikelets in spiciform panicles, or in spicate clusters with (in the Indian species) many imperfect spikelets of imbricating gls. at the base of the spike or of the clusters, 1- or more-fid. (Cynosurus has dimorphous spikelets).
Spikelets in a cylindric spike, articulate on very short pedicels; gl. I and II awned 98. FINGERHUTHIA.
Spikelets very minute, in globose clusters on an elongate simple rachis 99. Elyteophobus.  Spikelets in a dense unilateral panicle, uppermost of each
branchlet 1-fid., concealed by the longer lower empty gls
2-5-fid., lower of distrchous subulate empty pectinately arranged gls 101. Cynosurus.
Subtribe IV. Eragroster. Infl. various. Spikelets 2-many-fld.; fl. gls. 1-3-nerved, entire, 3-toothed, 3-lobed or 3-awned.
Panicle spiciform; spikelets 2-5-fld.; fl. gls. scarious, secund, mucronate or shortly awned 102. Korleria. Panicle effuse; spikelets 2-4-fld.; gl. I very short, 3-
nerved, sub 3-toothed, fl. gl. broadly truncate, 3-nerved
Infl. various; spikelets many-fld.; empty gls. shorter than the lowest fig. gl., 1-nerved; fig. gls. 3-nerved;
grain very minute, terete

•			•
	fl subpanicled; spikelets many-fld.; empty gl shorter than the lowest fig. gl. I 3-nerved, II 5-nerved;		Myriostachys.  Halopyrum.
Sp	concave ikelets sessile on the spiciform branches of a tall, broad		COELACHYRUM.
•	panicle, many-fld.; fl. gls. 3-4-toothed	108.	DIPLACHNE.
	Subtribe V. Melicer. Spikelets usually panicle any, upper smaller, empty, convolute in a clavate	mas	– or more-fid.; gls. s. Melica.
(†l.			4
	Subtribe VI. CENTOTHECEE. Spikelets 1- many chis of a simple spike or on the long slender brand Leaves broad, tessellately nerved.		
•	kelets 3- or more-fid., secund, persistent; fruiting gis.		LOPHATHERUM.
Sp	ikelets 1-4-fid., secund, 2-senate on the rachis of a		CENTOTHECA. STREPTOGYNE.
(ex	Subtribe VII. EUFESTUCEE. Spikelets usually pigls. 5— many- (very rarely 3-) -nerved, upper enterpt Duthiæa). (Spikelets of Brachypodium in leuropus in crowded spikes.)	pty	or 0; styles short
	kelets few-fld., in close secund clusters, gl. I and II		ÆLEUROPUS.
Sp	ikelets on a short panicle, subsessile, compressed; fl. gls.		SCLEROCHLOA.
Spi	kelets very small, in a narrow panicle with erect		Schismus.
Spi	kelets ovate, in a lax pyramidal panicle, pendulous; gls. inflated, awuless, closely imbricate, many-nerved,		
Spi	dorsally convex kelets laxly pamcled, few fid.; gls keeled, 5-nerved (3-in P. persica), awnless, nerves rarely meeting at	117.	Briza.
Spi		118.	Poa.
Spi	very short kelets panicled, many-fid., awnless; gls. obtuse, dorsally	119.	Colpodium.
	rounded, 5-9-nerved, lateral nerves short.  kelets panicled, many-fid.; fl. gls. acute or awned.		GLYCERIA.
Spi	dorsally rounded, top of ovary maked or hairy	21.	FESTUCA.
Spil		22.	Bromus.
	Z-nd; style very long, 2-fid		DUTHIÆA.
- հա	kelets spicate, many-fid., mucronate or awned	124.	BRACHYPODIUM.

Tribe X. HORDE.E. Spikelets 1- or more-fld., sessile, 1-2 or more seriate on the rachis of a simple spike, or partially sunk in cavities of the same; rachilla usually articulate and produced beyond the fig. gls. into a naked or glumiferous bristle; gls awned or not, I and II opposite or subcollateral, persistent or separately deciduous, I sometimes absent or very minute.

Subtribe I. LOLIE. Spikelets solitary at the nodes of the spike; plane of the spikelets radial to the rachis.

Spikelets 3- many-fld.; gls. coriaceous, I absent, except in the terminal spikelet.

. 125. LOLIUM.

Spikelets 1-2-fld; gl. I, minute or 0, II much longer than the hyaline III; spike cylindric, rachilla gla-

. 126. LEPTURUS.

Spikelets 1-3-fld.; gl. I, minute or O, II about as long

as the hyaline III; spike compressed, rachilla hairy. 127. OROPETIUM.

Subtribe II. TRITICE. Spikelets solitary at the nodes of the spike; plane of spikelets tangential to the rachis.

Fl. gls. 5-9-nerved, lateral nerves not conniving, short or ending in teeth or awns .

. 128. TRITICUM.

Fl. gls. 5-7-nerved, lateral nerves conniving or confluent with the single terminal awn . . .

. 129. AGROPYRUM.

Subtribe III. ELYMEE. Spikelets 2 or more, collateral or fascicled at the nodes of the spike; plane of spikelets tangential to the rachis.

Spikelets 1-fld.; empty gl. subulate, rigid . 130. Hordeum. Spikelets 2- many-fld.; empty gl. subulate, linear or oblong

. 131. ELYMUS.

Tribe XI. BAMBUSEÆ. Shrubby or arboreous grasses. Leaves flat, jointed on the sheath. Spikelets 1-\omega-fid.; lower 2- or more gls. empty, gradually increasing in size up to the flowering, with sometimes small terminal imperfect ones. Palea usually large, 2-keeled (in Melanocanna). Lodicules usually 3. Stamens 3, 6, or  $\infty$ . Styles 2-3.

Subtribe I. Arundinaries. Palea 2-keeled; stamens usually 3; pericarp thin, adnate to the seed.

Spikelets 1- many-fld., racemed or panicled; empty gls.

. 132. ARUNDINARIA.

Spikelets 1-4-fld., spicate; spathes bracteate; empty gls.

. 133. PHYLLOSTACHYS.

Subtribe II. EUBAMBUSEÆ. Palea usually 2-keeled; stamens 6; pericarp thin, adnate to the seed.

Filaments free; paleas entire or slightly cleft, all 2-keeled 134. BAMBUSA. Filaments free; paleas deeply cleft, uppermost not keeled 135. THYRSACANTHUS.

Filaments connate. Spikelets co-fid.; paleas all 2-keeled 136. GIGANTOCHLOA. Filaments connate. Spikelets few-fid.; palea of upper fl.

0 or glume-like, not keeled . 137. OXYTENANTHERA.

Subtribe III. Dendrocalamer. Palea 2-keeled; stamens 6; pericarp fleshy or crustaceous; seed free.

Spikelets 2- \infty -fld., 1 only usually fertile, usually capitate in the branches of the panicle; ovary hirsute at the . 138. DENDROCALAMUS. top, pericarp crustaceous .

Stamens 6-00. Pericarp crustaceous or fleshy, seed free. Spikelets in clusters on the branches of the panicle, rachilla

Spikelets very minute, clustered on the branches of the panicle, rachilla not produced; lodicules 0 . . 144. DINOCHLOA Spikelets bracteate, crowded in unilateral spikes, rachilla

not produced; fruit very large, fleshy . . . 145. Melocanna.

Spikelets large, capitate or subspicate; stamens 6 or more; fruit very large, pericarp fleshy . . . . . 146. Och

fleshy . . . 146. OCHLANDRA. EXCLUDED GENUS

PRIONANTHIUM, Desv. Opusc. 65 t. 4, is a S African grass, erroneously described as Indian. It was subsequently published by Nees as Prionachne Ecklonic.

# Tribe I. Paniceæ. (See p. 2.)

#### 1. PASPALUM, Linn.

Annual or perennial grasses. Spikelets 1-fld., secund in simple spikes or spikelike branches of a simple panicle or raceme, articulate on the pedicel but not thickened and callous at the base, never awned. Glumes 3 (homologous of II III and IV in Panicum), with rarely a very minute lowest fourth (I of Panicum); I and II subequal, membranous, both sometimes very small or I (at the back of the fl gl.) absent; II. epaleate; III more coriaceous, paleate, bisexual. Stamens 3. Styles 2, free. Grain free within the hardened glume.—Species perhaps about 160, natives of all warm regions.

As above defined, Paspalum includes the Digitaria section of Panicum, which appears to me to be artificially placed in the latter genus, because of the occasional presence of a very minute scale-like glume at the base of what is the 3rd gl. of Panicum (that opposite the fig). This minute glume which is present or absent even in the same species, is nerveless and never embraces that above it, as the lowest gl. always does in Panicum proper. One Indian species alone of Panicum (P. subeglume) has only 3 glumes, but its decompound panicle and the form of its spikelets and its affinities are with Panicum.

\* Spikelets orbicular or broadly oblong, ovate-oblong in P. distichum.

1. P. scrobiculatum, Linn. Mant. i. 29; spikelets about as broad as the flat rachis 1 in. diam. 2-4-ranked plano-convex or hemispheric, gl. I 3-nerved, II 5-nerved. Fluegge Monogr. Gram. 86 (Paspalus); Trin. Diss. ii. 122, Gram. Panic. 56, Sp. Gram Ic t. 143; Kunth Enum. Pl. 1. 53; Steud. Syn. Gram. 21; Roxb. Fl. Ind. i. 278; Grah. Cat. Bomb. Pl. 234; Dalz. & Gibs. Bomb. Fl. Suppl. 97; Thw. Enum. Pl. Zeyl. 357; Trim. Cat. Pl. Ceyl. 104; Aitchis. Cat. Panyab Pl. 104; Wall. Cat. n. 8753; Wight Cat. n. 1601; Duthie Field and Gard. Crops, 8 t. 27; Grasses N.W. Ind. 1; Indig. Fodd. Grass. t. 1; Fodd. Grass. N. Ind. 1; Miq. Fl. Ind. Bat. 111. 430; Benth. Fl. Hongk. 408, Fl.

Austral. vii. 460. P alternans, Steud. l. c. 26. P. auriculatum & cartilagineum, Presl Rel Haenk. 1. 217, 216. PP. bifarium, Edgrw. in Journ. As. Soc. Beng. xxi. (1853) 178. P coloratum, Rich. ex Doell in Mart. Fl. Bras. 11. 178. P. Commersoni, Lamk. Hlustr. i. 175. P. coromandelanum, Lamk l. c.; Kunth l. c. 55; Steud. l. c. 32. P. dissectum, Linn. Syst. 11. 86. P. dimidiatum, Linn. Syst. Ed. x. 855. P. firmum, Trin. Gram. Panic. 105, Sp. Gram Ic. t. 125; Kunth l. c. 60. P. flexuosum, Klein ex Presl l. c. 215; Kunth l. c. 54; Miq. Fl Ind. Bat. iii. 432. P. frumentaceum, Rottb. ex Roem. & Sch. Syst. ii. 296; Koen. ex Trin Gram. Panic. 57; Kunth l. c. 53. P. hirsutum, Retz. Obs. ii. 7; Kunth l. c. 33; Miq. l. c. 433. P. Houttuynii, H. C. Hall ex de Vriese in Pl Ind. Bat. Reinv. 113. P. Kora, Willd. Sp. Pl. i. 332; Host Gram. Austr. t. 74; Beauv. Fl. Owar. ii. 5, t. 61; Roxb. l. c.; Grah. l. c.; Duthie Indig. Fodd. Grass t. 2. P. longifolium, Roxb. l. c. 280; Trin. Sp. Gram. Ic. t. 138; Wight Cat. n. 1602, Herb. n. 1600. P. mauritanicum, Nees ex Steud. l. c. 26. P. metabolon, P. Metzii, and P. mollipilum, Steud. l. c. 19, 21, 29. P. orbiculare, Forst. Prodr. 7; Fluegge l. c. 88. P. polystachyum and P. pubescens, Br. Prodr. 188; Kunth l. c. 54, 55. P. puberulum, Roem. & Sch. Syst. ii. 316 (Paspalus). P. sumatrense, Roth Nov. Sp. 35; Kunth l. c. 55. P. Thunbergii, Kunth ex Steud. l. c. 28; Franch. & Sav En. Pl. Jap. 159. P. venustum, Forst. f. ex Roem. & Sch. l. c. 297. P. Zollingeri, Steud l. c. 28. Panceum dissectum, Linn. Sp. Pl. 57.—Paspalum, Wall. Cat. n. 8754. —Rheede Hort. Mal. xii. t. 84.—Sloane Hist. Jam. t. t. 69, f. 2.

Throughout hotter INDIA (wild or cultivated), from the Panjab eastwards and southwards to Singapore and Ceylon.—DISTRIB. All warm countries.

Annual, erect or base very shortly decumbent, 1-6 ft. high, leafy, glabrous, rarely hairy. Leaves acuminate; ligule short, membranous. Peduncle rather slender. Spikes 2-8, 1-3 in. long, alternate, erect or spreading; rachis  $\frac{1}{12}$  in. broad, margins ciliate or serrulate. Spikelets in 2, rarely 3-4 rows, imbricate, glabrous or sparsely pubescent, sometimes geminate on a common pedicel; gl. I convex; II flat with two submarginal strong nerves, along the inner margins of which the gl. is sometimes marked with shallow transverse pits (whence the specific name); gl. III. with inflexed auricled margins.—I find it impossible to classify the large series of specimens of this variable plant under available varieties. Roxburgh regarded the Indian forms as 3 species, scrobiculatum, Kora, and longifolium. Between the first two of these he gives no differential characters, beyond that of scrobiculatum having erect stems 2 ft. high and being a cultivated form, whereas Kora is indigenous, growing on the banks of watercourses and attaining 8 ft. (? error for 3 ft., as in the description that follows) and has the stem decumbent at the base. P. long folium he separates by the creeping stems, geminate terminal spikes and pitted seeds, but as Trinius describes the pitting is microscopic (as in other forms of the species). Having regard to the specimens before me, I recognize with more or less confidence (1) a form with larger dorsally tumid spikelets, which I assume to be the cultivated form (including orbiculare, frumentacum, Kora, coromandelianum, and hirsutum); its gl. II is either pitted or not; and (2) a form with rather smaller spikelets, often in 3-4 rows, and gl. II never pitted, to which I refer longifolium, Zollingers, and dissectum (which latter is the earliest name (under *Panicum*) of the species). It abounds all over India, and is the only form of which I have seen Malayan specimens. Besides the synonyms adduced above, as to which I am pretty well assured, there may be perhaps many more to be added.

2. P. conjugatum, Berg. in Act. Helvet vii. (1772) 129, t. 8; spikes 2 terminal or subterminal very slender, spikelets  $\frac{1}{16}$  in subsessile orbicular nearly flat, gl. II hyaline margins villously ciliate. Sw. Fl. Ind. Occ. i. 133; Fluegge Monogr. Gram. 102 (Paspalus); Beauw. Fl. Owar. 56, t. 92, f. 2; Trin Panic. Gen. 54, Sp. Gram. Ic. t. 102; Kunth Revie. Gram 25, Enum. Pl. 1. 51; Trim. Cat. Ceyl. Pl. 104. P. bicrurulum et

bicrurum, Saltzm ex Doell in Mart. Fl. Bras. ii. II. 55. P. ciliatifolium, Trin. in Mem. Acad Petersb. Ser. vi. iii 1I. (1835), 340. P. ciliatum, Lam. Illustr. i. 175. P. dolichopus, Trin ex Steud. Nom. ed. 2, ii. 271. P. eriophorum, Willd. ex Nees Agrost Bras. 56. P. hirsutum, Poir. Eucycl. v. 28. P. longissimum, Hochst. ex Steud. Syn. Gram. 19. P. nutaus, Lam Illustr. 1. 175. P. Renggeri, Steud. l. c. 17. P. piotensum, Trin Gram. Panic. 108 P. pubescens, Muhlb. ex Willd. Enum. Hort. Berol. 89. P. supinum, Bosc ex Poir. Encycl. v. 29. P. tenue, Gwith Fruct. ii. 2, t. 80. Digitaria conjugata, Schult. Mant. ii. 262.—Paspalus, Wall. Cat. n. 8756.

CACHAR, Keenan. PENANG, Curtis, &c. SINGAPORE, King. CHYLON, Thwaites

("introd. from W. Indies")-DISTRIB. Trop. and subtrop regions.

Annual. Stems 1-2 ft., creeping and branching below. Leaves 4-6 by \( \frac{1}{2} \) in., or less, margins of sheath above, and mouth ciliate. Peduncle very slender Spikes 3-7 in, usually geminate and divergent, rachis glabrous. Spikelets imbricate, very pale, plano-convex; glumes with marginal, villous nerves, and an obsolete median; III cornaceous, apiculate, white.—A very elegant grass.

3. P. compactum, Roth Nov. Sp. 36; dwarf, hairy all over, spikes forming a pyramidal raceme, tachis slender triquetious, spikelets  $\frac{1}{2}$ 0 in. hemispheric. Kunth Enum. Pl. i. 61; Steud. Syn. Gram. 31. P. costatum, Hochst. in Herb. Hohenack. n. 635. P. miliana, C. Miell. in Bot. Zeit. xix. (1861), 325. P. porrigens, Arn in Herb. Wight. Panicum Canara, Steud. l. c. 58. Pan. imperfectum, Roxb ex Kunth l. c.

KHASIA HILLS, in wet places, alt. 3-5500 ft., Grifith, &c. RAJPUTANA; Mt. Aboo, Duthie. The Concan and Canara, Jacquemont, &c. Nilghiri Hills, Lawson.

Stem 6-10 in., decumbent, and branched below; roots stiff, wiry. Leaves 1-2 by \(\frac{1}{3}-\frac{1}{2}\) in., ovate-lanceolate, acummate, hairy on both surfaces. Raceme 2-4 in; spikes many, upper gradually shorter; axils usually cluste. Spikelets rather turgid, close-set, but not imbricate, pendulous by short pedicels; gl. I orbicular, obscurely 3-nerved; II narrower, margins broadly hyaline; III plano-convex, white, coriaceous, tip rounded.

4. P. distichum, Linn. Aman. Acad. v. 391; stem creeping and rooting, leaves nairow distichous, spikes geminate, spikelets in ovateoblong, appressed to the rachis, gl. I and II equal acute membranous, III acute. Burm. Fl. Ind. 23; Sw. Obs. 35, t. 2, f. 1; Gærtn. Fruct. ii. 2, t 80; Kunth Enum. Pl. i. 52; Benth. Fl. Austral. vii. 460; Baker Fl. Maurst. 431. P. brachiatum, Trin. ex Nees Agrost. Bras. 62. P. depressum, Steud. Syn. Gram. 20. P. didactylum, Saltzm. ex Steud. l.c. P. digitaria, Poir. Encycl. Suppl. iv. 316. P. distachyon, Willd. ex Doell in Mart. Fl. Bras. ii. II. 73. P. Fernandesianum, (Iolla in Mem. Acad. Turin. xxxix. (1836), 27. P. fissifolium, Nees ex Doell l. c. 104. P. furcatum, Fluegge Gram. Monogr. 114 (Paspalus). P. geniculatum, Heyne in Herb. Rottl. P. Kleinianum, Presl Rel. Hank. i. 209; Steud. l. c. 19. P. Kora, Forst. ex Spreng. Syst i. 244. P. littorale, Br. Prodr. 188; Trin. Diss. ii. 95, Sp. Gram. Ic. t. 112; Kunth Enum. l. c. 51. P. longiflorum, Retz. Obs. 1v. 15, ex Roxb. Fl. Ind. i. 279; Beauv. Fl. Owar. ii. 46, t. 85, f. 2; Grah. Cat. Bomb. Pl. 231. P. maculosum, Trin. Gen. Panic. 98, Sp. Gram. Ic. t. 113. P. Michauxianum, Kunth Revis. Gram. i. 25. P. notatum, Fluegge l. c. 106. P. obtusatum, Nees ex Doell. l. c. 103. P. obtusifolium, Trin. Sp. Gram. Ic. t. 115. P. platycaule, Willd. ex Steud. Nom. ed. 2, ii. 272. P. repens, Ic Roxb. n. 779. ined. P. reptans, Poir. ex Doell l.c. 75. P. serpentinum, Hochst. ex Steud. l.c. 22. P. tristachyum, Leconte in Journ. Phys xii. (1820), 285. P. vaginatum, Sw. Prodr. Voy. Ind. Occ. 21; Fluegge l. c. 108 (Paspalus); Beauv. l. c. ii. 53, t. 92; H. B.

- & K. Nov. Gen. & Sp i 91; Trin. Diss. 11. 94, Panic Gen. 53, Sp. Gram. Ic t 120; Kunth Enum 52; Steud. 1 c. 20. Panicum polyrhizum, Presl 1 c i 296. Pan. vaginatum, Gren. & Godr. Fl. Fr. 111. 462—Paspalus, Wall Gat. n. 8757?—Rheede Hort. Mal. xii. t 44.
- N. W. India, Duthre. Sunderbunds, Rorburjh, J. D. H. & T. T. Malabar, Rheede. Carnatic, Heyne. Malacoa, Griffith. Andaman Islds., Prush.—Distrib. warm countries.
- Stems 1-6 in., erect or inclined from the long creeping base, usually stout, compressed below. Leaves 2-4 in, strict, flat or involute, glabrous or sparsely hairy towards the flattened sheath. Sphes close together, 1-1½ in., rachis narrower than the 2-seriate spikelets. Glumes faintly nerved.—Apparently a rarer plant in India than in most tropical countries. Andaman Isld. specimens have a stout, woody, energing stem, with thickened nodes, and very short, erect flowering branches, with distichous, subulate, spreading leaves, and spikes partially exserted from the uppermost sheath.
  - \*\* Spikelets ovoid, ellipsoid, or lanceolate.
- † Spil. lits  $\frac{1}{10}$   $\frac{1}{4}$  nn. long, with often a minute scale-like gl. at the base of gl. II. (Digitable, Auct.).
- 5. P. sanguinale, Lamk. Illustr. i. 176; spikes few or many, spikelets  $\frac{1}{10} - \frac{1}{10}$  in oblong or lanceolate acute or acuminate, gl.  $I = \frac{3}{3}$  III or shorter or 0, II 5-nerved with or without a minute busal gl., III and is palea oblong-lanceolate acuminate. D.C. Bot. Gall. iii. 16. P. ægyptiaeum, Poir. Eucycl. Suppl. iv. 314. P. bicorne, Lam. l. c. 176; Poir. Encycl. v. 29, Suppl. 306. P. blepharophorum, Roem. & Sch. Syst. ii. 292. P. ciliare, DC. Fl. Fr. Suppl. 250. P. consanguineum, Kunth 11. 292. P. ciliare, DC. Fl. Fr. Suppl. 250. P. consangumenm, Kunth Enum. Pl. i. 46. P. corymbosum, Kunth Enum. 48; Revis. Grum. 1. 28. P. distans, Nees ex Trin. Gram Punic. 83. P. filiformo, Steud. Nom. ed. i. 586. P. inæquale, Link. Enum. Hort. Berol. i. 103. P. oxyanthum, Steud. Syn. Gram. 27. P. reimarioides, Brongn. Bot. Voy. Coquillo, t. 20. Paulcum sangunale, Linn. Sp. Pl. 57; Schreb. Beschr. Graes. t. 16; Fl. Dan. t. 388; Host Gram. Austr. ii. t. 17; Lamk. Encycl. Bot. t. 849; Knapp Gram. Britt. t. 12; Trin. Sp. Gram. Ic. t. 93, 94, 144; Thw. Enum. Pl. Zeyl. 358; Trim. Cat. Ceyl. Pl. 104; Aitchir. Cat. Panjab. Pl. 161, Duthie India Fodd. Grass. t. 8, Grass. N.W. Ind. 2; Benth. Fl. Hongl. 410. El. Austral. vii. 439; Rakor. El. Muuril. 435. Roise. El. Fl. Hongk. 410, Fl. Austral. vn. 459; Baker Fl. Maurit. 435 Boiss. Fl. Orient. v. 433. Pan. agyptiacum, Retz. Obs. iii. 8; Roxb. Fl. Ind. i. 294; Dalz & Gibs Bomb, Fl 291; Griff Notul. iv. 17, Ic. Pl. Aisat. t. 139, f. 131.

  Pan. adpressum, Willd. in Ges. Naturf. neue Schrift. iv. (1803), 193;

  Kunth Enum. Pl i. 84. Pan. bicorne and biforme, Kunth Revis. Gram. i. 33; Enum i. 83, 84. Pan. ciliare, Retz. Obs. iv. 16; Kunth Enum. i. 82; Host Gram. Austr. iv. t. 15; Br. Prodr. i. 192; Roxb. Fl. Ind. i 290; Dalz. & Gibs. l. c. 290, Thw. Enum. 358; Griff. l. l. c. c. 32, t. 139, f. 65; Duthre Indign. Fodd. Grass. t. 9; Pan. commutatum, Ness in Linnæu, vii. (1832), 274; Berth. Fl. Hongk. 410. Pan. corymbosum, Rowb. l. c. 292. Pan. didactylum, Kunth l. l. c. c. 33, 84; Baker Fl. Maurit. 435 Pan. eriogonum, Schrad. Pl. Hort. Goett. fasc. i. ex Schult. Mant. 11. 253, Kunth l. l. c. c. 33, 82. Pan. filiforme, Jacq. Obs. iii. 18, t. 70. Pan. horizontale, Mey. Prim. Fl. Esseq. 54; Kunth Enum. i. 81. Pan. Linkianum. Kunth Revis. Gram. i. 33. Pan. pabulare, Aitch. & Hemsl. in Journ. Linn. Soc. xix. (1882), 190; Boiss. Fl. Orient. v. 434. Pan. prurions, Fisch. ex Trin. Diss. in 77, Gen. Pan. ii. 77, Sp. Gram. Ic. t. 92; Kunth Enum. i. 83. Pan. radicosum, Prest Rel. Hank. i. 297; Kunth l. c 81. Pan. Rottleri, Kunth Revis. Gram. i. 33; Enum. l.c. 82. Digitaria ægyptiaca & biformis, Willd Enum. Hort. Berol. 92, 93. D.

australis, Willd. ex Trin in Mem. Acad. Petersb. Ser vi. iii. (1835), II. 201. D ciliaris, Pers. Syn. i 85. Ledeb. Fl. Ross. iv. 468; T. Nies Gen. Fl. Germ. Monoc. n. 16; Reichb. Ic. Fl. Germ. 1. t. 27; Mig. Fl. Ind. Bul. iii. 436; Ledeb. Fl. Ross. iv. 468. D. commutata, Schult. Mant. ii. 262. D. didactyla, Willd. l. c. 91. D. distachya, Bojer Hort. Maurit. 363; Lamk. Illustr. t. 43, f. 2. D. eriantha, Steud. in Flora, xii. (1829), 468. D. eriogona Link Enum. Hort. Berol. i. 227, in Flora, l. c. D. horizontalis, Willd. l. c. 92. D. linearis, Pers. l. c. D. marginata, Link. l. c. 102. D. nervosa, Roem. & Sch. Syst. u. 473. D. nodosa, Webb. & Berth. Phyt. Canav. ui. III. 384, t. 246. D. pruriens, Buse in Pl. Jungh. 379; Mig. l. c. 436. D. radicosa, Mig. l. c. 437. D. repens, Willd. ex Kunth. l. c. 81. D. Rottleri, Roem. & Sch. l. c. 471. D. sanguinea, Scop. Fl. Carniol. 72; Weber in Willd., Prim. Fl. Holsat. 6. D. sanguinalis, Scop. l. c. ed. 2, i. 52; Reichb. l. c. t. 87; Parlat. Fl. Ital. i. 125 (with full citations). D. sanguinoleuta, Edgew. ex Aitch. Cat. Panyab. Pl. 161. D. setigera, Roth. ex Roem. & Sch. l. c. 474. Dactylon sauguinale, Vill. Delph. ii. 69. Phalaris velutina, Forsk. Fl. Æg. Arab. 17. Syntherisma vulgare, Schrud. Fl. Germ. i. 161. S. ciliare, Schrad. l. c. t. 3, f. 7. ? Axonopus corymbosus, Schult. Mant. ii. 77.

Throughout India, in dry and moist situations, ascending the Himalaya to

6 00 ft (cult in the Khasia Hills).—DISTRIB. all warm countries.

Annual or perennial. Stem 2 in. to 3 ft, erect or ascending from a creeping. branching base. Leaves very variable, 1-12 by 1-1 in ; sheaths rarely hairy, except Spikes 1-3 in., raiely more, usually strict; rachis at or near the mouth. trigonous or flattened, stout or slender, or winged, wings green, rarely more than twice the breadth of the midrib, margins smooth or ciliolate. Spikelets geminate, loosely or closely imbricate, tarely scattered; gls. often silkily harry along the margins and nerves. The hairs in the upper spikelet of var. ciliare sometimes abnormally developed into a long beard or brush of curved cilia; there is every gradation between the most densely bearded and almost glabrous spikelets (see also P. heteranthum); gl. I (at the back of the fig gl) variously developed from an obscure tuft of hairs to nearly as long but not quite so broad as III, 3-5-nerved, usually silky; II 5-nerved, lateral nerves marginal, rarely all close together, and with the interspaces thickened, when the gl. appears many-nerved; III. lanccolate or oblonglanceolate, smooth -The above definition embraces a wide range of forms, which I believe are all referable to P. sanguinale. The species is one of the very commonest plants in India, and in all warm countries. A form (var. commutatum) is cultivated in the Khasia Hills, of which fact I find no notice in any work on Indian food grains. The following attempt to classify the Indian forms is founded on a close study of an enormous collection of specimens from all parts of India, amongst which those of Mr. C. B. Clarke are especially noteworthy. As to the result, I am satisfied that no two botanists working independently over the same materials would arrive at the same, or agree in any other; and that the results of working over a large collection from any other country would again be different. I have made no attempt to deal with the American forms, at which I have only glanced; they suggest no modification of my arrangement of the Indian.

Var. 1. cruciatum; spikes several 2-3 in. usually horizontal, rachis slender trigonous narrowly or rather broadly winged, spikelets ovate-oblong acute or cuspidately acuminate rather loosely imbricate quite or nearly glabrous purple or green, gl. II half as long as 1II ovate-oblong obtuse 3-nerved, III ovoid or obovoid rather turgid cuspidately acuminate. Panicum cruciatum, Nees ew Steud. Syn. Gram. 39. P. sanguinale, Wall Cat. n. 8681. K.P.—Panicum, Wall. Cat n. 8728. Digitaria cruciata, Nees ew Herb. Strach. v. Winterb. No. 3.—Himalayan region, alt. 5-8500 ft., from Iskardo and Kashmir to Sikkim and the Munnipore

hills.—This form appears to me to be most nearly allied of any in habit and

spikelets to Pasp. ambiguum.

Var. 2 commutatum; usually tall, stout or slender, tufted or prostrate and widely creeping below, leaves rather long, spikes few or many (up to 20) 3-6 in. long fastigiately or subcorymbosely arranged, lower often whorled or fascicled, rachis slender narrowly winged, spikelets broad rather crowded shortly pedicelled, gl. I lanceolate rather shorter and narrower than III, II with the lateral nerves glabrous or pubescent, and with usually a minute gl. at the base, III lanceolute acuminate. Pan. commutatum, Nees in Herb. Royle; Digit. ciliaris? Wight Cat. n. 1609, Herb. n. 3033; Pasp. paniculatum, Herb. Jacquemont., Pan. sanguinale, Herb. Strach. & Wint. n. 1. P. ciliare, Thwaites (C.P. n. 861, 862).—Pamoum, Wall, Cat. n. 8681 A (racemosum, Herb. Heyne) B.C. (filiforme, Herb. Heyne) E F.H.I.M.N.O.P.; P. filiforme and tenuifolium, Heyne in Herb. Rottl. l.c. ? P. corymbosum, Roxb. l.c. P. filiforme, Roxb. Ic. ined .- Throughout India, especially in the hills, ascending to 7000 ft. along the Himalaya, and to 10,000 in Western Tibet.

—(Asia, Africa.) This is the typical S. African Pan. commutatum, Nees, but
I am doubtful as to its being the P. corymbosum, Roxburgh, which is described as found "only in valleys of the Circars, growing to a great size in standing waters, with culms creeping, or floating with their erect extremities above water; when found on dry ground it is in general 1-4 ft. high, Rowb." A specimen of var. commutatum in Herb. Kew is labelled Pan. filiforme in Roxburgh's handwriting, but probably the ticket is misplaced.

Var. 3, ciliare; usually tall, slender, spikes few (2-6) 3-6 in. long, rachis slender narrowly winged, gl. I long or short ciliate, gl. II of lower spikelet, with glabrous or sparingly villous, marginal nerves, of upper spikelet with the marginal nerves densely villous or bearded with soft spreading hans that are much broader than the gl. and often hooked at their tips. P. ciliare, Retz.; Wall. Cut. n. 8682).—Digitaria ciliaris, var. quadristachya, Wight Herb. n. 3034. D. commutata, Herb. Strach. & Winterb. n. 2. The bearded glumes may occur in other of the varieties here enumerated (as in var. debile from the Nicobars) as it is only when the spikelet is well advanced that the beard appears to be fully developed.—

Very common.

Var. 4, pabulare; perennial, tall, strict, erect, spikes very many 3-7 in., rachis slender trigonous, spikelets rather distant narrowly lanceolate acuminate silkily villous white, gl. I as long as III 3-nerved, II with approximate nerves and usually a minute accessory gl. at its base, III very narrow acuminate. Pan. pabulare, Aitchis. & Hemsl. l. c.—The lower hills of the Panjab, Affghanistan, and Beluchistan, Jacquemont, &c.

Var. 5, pruriens; erect, glabrous, or sheaths hirsute, spikes many 3-5 in., rachis slender trigonous, spikelets narrowly lanceolate acuminate nearly glabrous, gl. I nearly as long as III, II very narrow, with approximate nerves and a minute basal gl., III very narrow acuminate. Pan. pruriens, Euch. L. c.—Bengal, Wallich (Cat. n. 8681, L.). Burma, Grifith, Malacca, Cuming (n. 2397), Mangay (Kew Distrib.

1729), (Java &c).—Hardly different from var. extensum.

Var. 6, Griffithi; spikes several 2-4 in. long very slender often drooping, rachis filiform trigonous, spikelets linear-lanceolate solitary or in distant pairs glabrous or culiate, pedicel of upper often longer than the spikelets, gl. I nearly as long as III narrow 5-nerved ciliate, II with ciliate lateral nerves, III narrow acuminate. Panicum Griffithii, Arn. in Herb. Wight. Pan corymbosum, Thw. Herb. (C.P. 3800). Pan. disstifiorum, Nees & Arn. in Wight Cat. n. 2341 (not of Stead.). Pan. sangunale, Wall. Cat. n. 8681, D.G. and 8748. Pan. Rottleri, Kunth (nervosum, Willd.) Herb. Wight. n. 1610 (not of Lunth Revis. Gram) — Panicum? Wall. Cat. n. 8748.—Madras, Burma, Ceylon.—This resembles Pan. commutatum, but has filiform spikes of scattered, longer pedicelled spikelets. It occurs in S. Africa, and no doubt elsewhere. There is no locality on Arnott's ticket of Griffithii, which is doubtless from the Madias peninsula, he has added to it, Wight Cat. n. 2057, which is Pan. horizontale, var. macanthrum, Nees, of which I have seen no specimen.

Var. 7, extensum; stout or slender, sheaths glabrous or hirsute, spikes few or

many, rachis narrowly winged, spikelets oblong-lanceolate acuminate more or less cliate, gl. I half the length of III or less or minute cliate. Pan. extension, Net & Arn. in Wight Cat. n. 2340 (which is Pan. dilatation, Steud. 1. c. 39). Pan. nervosum, Rottler in Ges. Naturf Fr. Neve Schrift. iv. (1803), 194 (not Rold). P. finforme, Herb. Roch.—Common. This resembles a slender form of var.

commutatum, with reduced gl. I.

Var. 8, debile; small or dwarf, 4-10 in. high, much branched from the tufted or prostrate or creeping base, glabrous or hairy, spikes 2-5 1-3 in digitate or nearly so slender, wings of rachis narrower than the undrib, spikelets lanceolate acuminate, gl. I. from minute to nearly as long as III ciliate, II 5-nerved glabrous or ciliate. Pasp. debile, Posr. Encycl. v. 34 (excl sym); Roem. & Sch. Syst. ii. 303. Pan. debile, Pesf. Fl. Atlant i. 59; Bertol. Fl. Ital ii. 778; Trin. Panic Gen. 117. Digitaria debilis, Willd. Enum Hort. Berol. i. 91; Parlat. Fl. Ital. i. 127—Plains and low hills, from Bengal to Burma, Malacca, and the Andaman and Nicobar Islds. Ceylon (C.P. n. 856, 857).—Wall. Cat. 8683 (spikes longer, more slender). A very common dwarf form in low ground or poor soil, passing into var. commutatum, and the following The specimens with gl. I nearly as long as III are typical Pan debile of the Mediteranean region, but there is a gradual shortening of that gl. to a mere

Var. 9, Rottleri, characters of var debile, but rachis of spike stouter broader green, the wings two or three times broader than the midrib, glumes broader as in commutatum, of which it is a dwarf form.—It resembles Host's and Reichenbach's figures of cultare. Pan. Rottleri? and P ciliare, Wight Heib. n. 3032 (not Cat.

fimbriate scale. A muute accessory gl. at base of gl II is present or absent. The

1610), and 3033.—Common in the plains of India.

Nicobar specimens have the bearded upper spikelet of var. ciliare.

7. P. heteranthum, Hook. f.; stem stout, spikes many 6-12 in., rachis very stout rigid trigonous, spikelets in very distant, upper long-pedicelled lanceolate, gls. rigid finely acuminate, I and II longer than III, of lower spikelet glabrous of upper villous. Panicum barbatum, Kunth Revis Gram i. 33; Enum. Pl. i. 84; Steud. Syn. Gram. 43. Benth. Fl. Hongk. 410 Pan. elytroblepharum, Steud. in Noll. Syst. Verz. 54. Pan. eminens, Steud. l. c. 43. Pan. heteranthum, Nees et Meyen in Non. Act. Nut. Cur. xix. Suppl. i. (1843), 174; Steud. l. c. 43. Digitaria barbatu, Willd. Enum. Hort. Berol. 91. D. elytroblephara, Miq. Fl. Ind. Bat. iii. 439.

MALAY PENINSULA; Pahang, Ridley .- DISTRIB. Java, China.

A very remarkable species, of which I have seen only one Malayan specimen. The spikes appear to be irregularly produced, being leafy where their bases meet; rachis strict or flexuous, margined with green. Lower spikelet of each pair with very strongly nerved, acuminate, glabrous gls., and no small basel gl., upper with a rigid pedicel and minute, orbicular, naked, basel gl., its other gls. densely villous; gls of the upper spikelet at length spreading, hairs very long, with hooked tips.—Perhaps only an extreme form of P. sogwinale, var ciliare. I have seen no authentic specimen of P. elytroblepharum, but Miquel's description of it accords with the Malayan plant, and he cites P. emmens as a synonym.

8. **P. pennatum,** Hook. f.; spikes 8-10 radiating elongate fillform ciliate, spikelets  $\frac{1}{8}$  in. solitary or binate narrowly lanceolate subsilky, gl. I as long as III 3-5-nerved, II with or without a minute basal one nerves, 5 equidistant, III narrowly elliptic-lanceolate acuminate. Panicum pennatum, Hochst. in Flora, xxxviii. (1854), 197.

SIND; at Kurrachee, Stocks Beluchistan, Frere.—Distrib. Arab., Abyssin. Stem 1-2 ft., branching from the suberect or prostrate base, slender. Leares 1-6 by \$\frac{1}{6}\$ in., glabrous, or sheaths and sometimes margins and both surfaces harry, cliate with long hairs towards the base; ligule rather long, membranous. Spike. 3-6 in.; rachis almost capillary, trigonous, very rurely branched, cilia very long. Spikelets erect, pedicel of the upper almost as long as the gls.

9. P. ambiguum, DC. Fl. Franc. iii. 16; stems diffusely decumbent or ascending, spikes 2-4 subdigitate spreading, rachis narrowly winged, pedicels nearly glabrous, spikelets imbricate 12 in. elliptic subacute silkily pubescent with slender hairs or glabrate, gl. I nearly = III, II 5-nerved, III ovate-oblong acute. Panicum ambiguum, Lapeyr. Hist. Abr. Pl. Pyr. 31; Fig. & Not. in Act. Tor. (1854) 336, t. 11; Sang. in Atti Linc. Ser. I. xviii. (1865) 219, t. 421. Pan. arenarium, Bieb. Fl. Taur. Cauc. i. 52. Pan. distichum, Gaudin ex Steud. Nom. Ed. II, ii. 255. Pan. glabrum, Gaudin. Agrost Helvet. i. 22; Fl. Helvet. i. 155; Trin. Diss. ii. 83; Sp. Gram. Ic. t. 149; Kunth Enum. Pl. i 83; Boiss. Fl. Orient. v. 433; Steud. Syn. Gram. 1. Pan. humifusum, Kunth Revis. Gram. i. 33. Pan. Ischæmum, Schreb. ex Schweigg. Spec. Fl. Erlang. 16. Pan. lineare, Krock Fl. Siles. i 95. Pan. sanguinale, Pollich. Hist. Pl. Palat. i. 57. Digitaria filiformis, Koel. Descr. Grum. 26; Reichb. Ic. Fl. Germ. t. 27. D. glabra, Beauv. Agrost. 160; Ledeb. Fl. Ross. iv. 468; Parlat. Fl. Ital. 1. 127. D. humifusa, Pers. Syn. i. 85; Engl. Bot. t. 2613. D. linearis, Rostaf. in Verh. Bot. Zool. Ges. Wien. xxii. (1872) 99. D. procumbens. Hort. ex Steud. Nom. Ed. II, i. 508. Syntherisma glabrum, Schrad. Fl. Germ. i. 163.

WESTERN HIMALAYA, alt. 5-10,000 ft.; Kashmir, Stewart; Simla, Thomson. WESTERN TIBET, alt. 8-10,000 ft., Thomson.—Distrib. Europe, N. Asia.

Stems 6-12 in., usually diffusely spreading, rarely erect. Leaves linear-lanceolate, acute, glabrous; mouth of sheath hairy. Spikes 2-6, 1-2 in. long, suberect or divaricate, green or reddish. Spikelets variable in hairiness; the hairs often with slightly clavate tips; gl. II with rarely a minute one at the base; III quite smooth.—Very similar to var. cruciatum of P. sanguinale, but has smaller broader not acuminate spikelets, and gl. IV is never acuminate. Even more like P. ternatum, which is best distinguished by the bristle-like hairs on the pedicel, and short clavate ones on the outer gls.

10. P. ternatum, Hook. f.; stems erect or decumbent below, spikes 2-3 subdigitate erect or spreading, rachis narrowly winged ciliclate, spikelets 12-10 in. geminate imbricate elliptic subacute villous with clavellate hairs, pedicels setulose, gl. I nearly = III or shorter, II 5-nerved nerves equidistant, III ovate-oblong acute. P. humifusum, Heyne ex Wall. Cat. n. 8755. Panicum ternatum, Hochst. in Flora, xxvv. (1841) i. Intell. 19; Steud. Syn. Gram. 40. Cynodon ternatum, A. Rich. Tent. Fl. Abyss. ii.

WESTERN GHATS; Bababudan Hills, Heyne; Belgaum, Ritchie. KHASIA HILLS:

Pomrang, alt. 4-5000 ft., J. D. H. & T. T.-DISTRIB. Abyssinia.

Habit of P. ambiguum. Leaves 2-5 in., linear-lanceolate or linear; sheath glabrous or with a few hairs, mouth ciliate; ligule short, membranous, truncate. Spikes 2-3 in., silvery-white. Spikelets pale, pedicels short, hispid with stiff hairs, the upper hairs half as long as the spikelet; gl. I and II with the hairs forming a dense fringe along the margins .- The Belgaum and Khasian specimens are tall and long leaved; the Bababudan ones very short. Said by Schimper to be a pest in cultivated land in Abyssinia. It so closely resembles *P. ambiguum*, that without microscopical examination of the hairs of the spikelets it is very difficult to distinguish it from that species. A Ceylon plant, from Thwaites (C.P. 2573), with larger spikelets than P. longiftorum (to which I doubtfully refer it), cannot be distinguished from P. ternatum except by the structure of the hairs of the spikelet.

- †† Spikelets  $\frac{1}{24} \frac{1}{16}$  in., with no minute gl. at base of II.
- 11. P. longiflorum, Retz. Obs. iv. 15 (non Trin.); stems procumbent below rarely erect from the base, spikes 2- many subterminal erect or VOL. VII.

spreading, rachis filiform, spikelets \( \frac{1}{18} - \frac{1}{14} \) in elliptic-oblong silky with slender (not clavellate) crisped hairs, pedicels glabrous or nearly so, gl I and II subequal or I shorter or obsolete, II 5-nerved, III ovate acuminate. Wall. Cat. n. 8751, C.; Wight Cat. n. 1603; Baker Fl. Maurit, 431. P. bifarium, Edgew. in Journ As. Soc. Beng. xxi. (1853) 157 nomen. (ex Thw. Enum. Pl. Zeyl. 358) P. brevifolium, Fluegge Gram. Monog 150 (excl. Syn); Kunth Enum. Pl. i 48, Wight Cat. n. 1603, 1604. Steud. Syn. Gram 41; Benth. Fl Hongl. 408, Fl. Austral. vin. 461; Franch. & Sav. En. Pl. Jap. 11. 159. P. chinense, Nees in Hook. & Arn. Bot Beech. Voy. 231; Steud l c. P. filiculme, Nees ex Thw. l. c., Wight Cat. n. 1604; Trim. Cat. Ceyl Pl. 104, Franch. & Sav. l. c.; Duthie Grass N.W. Ind. 1. P. granulare, Trin. in Spreng. N. Entdeck iii 47; Kunth l. c. 50. P. minutiforum, Steud. l. c. 17; Benth. l. c. P. nematodes, Schult. Mant. ii. 71; Kunth l c. 65. Panicum argyrotrichum, Anderss. in Peters Reise Mossamb. Bot. 548 Pan lineare, β Pseudo Duroa, Necs in Herb. Wight. Pan. longiflorum, Gmel. Syst. 158, Wall. Cat. n. 8751 A. Pan. parvulum, Trin Pan. Gen 117, in Mem. Acad. Petersb. Ser. vi. iii II (1835) 305. Pan propinquum, Br. Prodr. 193. Pan. Pseudo-Duroa. Nees Fl Afr. Austr. 21; Wight Cut. n. 1608. Pan tenufforum, Br. l. c.; Kunth l. c. 85; Duthie Grass N.W. Ind. 7, Fodd. Grass. N. Ind. 13. Digitiria linearis, Schult. Mant. 11. 264 (ex Miquel). D. longiflora, Pers. Syn. i. 85. D. Pseudo-Duroa. Miq. Fl. Ind. But. iii 439 D. Roxburghii, Spreng Syst i. 270. D. tenuiflora, Beauv. Agrost 51. Milium filiforme, Roxb. Fl. Ind. i. 314; Wight Cat. n. 1604, a. b.c. M. iadiatum, Herb. Rottl. M. setaceum, Herb. Koen. in Mus. Brit. M. triracemosum, Roxb. lc. Ined. n. 315. Agrostis lenta, Att. Horf. Kew. i. 96. A. triracemosa, Herb. Roxb.—Paspalum, Wall Cat. n. 8751, 8752 B. D.E.

Throughout India, from Kashmir eastwards and southwards to Ceylon (C.P. 860) and Malacca; ascending the Himalaya to 6000 ft.—DISTRIB. Trop. and subtrop.

regions of the Old World.

Annual or perennial? Stems tufted, 6-18 in., simple or branched below and rooting with ascending branches, or prostrate. Leaves very various, 1-11 in. long lanceol te and divaricate, or 6-8 in. long, linear erect or spreading, sheath smooth or hairy; ligule short, truncate, membranous. Spiles 1-4 in., subdigitate or alternate, usually silvery-white. Spikelets geminate, a subsessile and pedicelled, pale green or purplish; gl. III pale, or dark brown.—The extreme forms of this species are very dissimilar, the most marked are P. longifionum, proper (brevifolium, Fluegge), with often prostrate stems spreading from the root or creeping and rooting from 6-12 in with short lanceolate leaves, and 2-3 divaricate spikes, and P. minutiflorum, Steud. with slender creek stems, narrow linear leaves and many long erect spikes, exactly as P Royleanum. The hairs on the spikelets seen under the microscope are very slender and as it were crisped or wrinkled, quite unlike those of P. ternatum and Royleanum. Thwaite's CP. n. 2573 is a puzz'ing plant, tall, with much longer spikelets, approaching those of P ambiguum. Though in this species and its allies there is no distinct gl. at the base of II, a microscopical rudiment of one may often (always?) be detected.

12 **P. Royleanum**, Nees cx Thw. Enum. Pl. Zcyl. 358; erect or shortly decumbent below, leaves usually erect, spikes 2-10 erect, rachis filiform, spikelets  $\frac{1}{2}e^{-\frac{1}{16}}$  in. oblong, gl. I and II densely crisply white-tomentose with clavellate hairs, pedicel setulose, gl. I =  $\frac{3}{4}$  III or shorter or obsolete, II broadly oblong subacute 5-nerved, III oblong subacute quite smooth. Trim. Cat. Pl. Ceyl. 158; Herb. Strack. & Winterb. Pasp. n. 2; Duthie Grass. N.W. Ind. 1. P. filiculme, Herb. Strack. & Winterb. n. 3

(non Nees). P. trachyanthum, Nees in Herb. Wight. Panicum puberulum, Kunth Revis. Gram. i. 32; Enum. Pl. i. 81; Steud. Syn. Gram. 41. Digitaria puberula, Link Enum. Hort Berol. 1. 223. Milium ovatum, Heyne ex Wall. Cat. n. 8752. Agrostis villosa, Koen. in Herb. Mus. Brit. Zoysia Codia, Ham. in Wall. l. c.—Paspalum, Wall. l. c. n. 8684, 8752, A.C.

Hilly districts of India, from Kashmir eastwards to Munnipore, and southwards

to Ceylon; ascending the Himalaya to 7000 ft.—DISTRIB. Africa trop.

Habit of the tall forms of *P. longistorum*, almost always erect with long leaves, except in starved specimens; well distinguished from that plant (as Dr. Stapf first pointed out to me) by the short clavellate thick walled hairs of the spikelets, and the usually setulose pedicels, the longer hairs of which are sometimes half as long as the spikelet, as also by the shorter broader gl. III, which is (as in *longiforum*) pale yellowish or dark brown and shining. Gl. I is often reduced to a tuft of hairs; II always = III.—This species was referred by Munro to *P. ischnocaulon*, Trin., a grass erroneously attributed to Iudia, by its author in Sp. Gram. Ic. t. 126, but corrected to America in the corrigenda at the end of that work. Some specimens have been referred by Munro to *P. concumum*, Steud (Syn. Gram. 19), a very doubtful species of unknown origin. In the Ceylon specimen, C.P. 859, the pedicels are hardly setulose. In African specimens, apparently of this species, they are remarkably developed and longer than the spikelets. Specimens from Poona are tall, 2 ft. high, very robust, and branched from the base. Steudel's *P. Royleanum* is according to his description a very different plant, and judging by his reference of it to Wall. Cat. n. 8700 B. is *Panicum aurutum*.

13. **P. pedicellare,** Trin. ex Steud. Nom. Ed. II, ii. 272; erect, spikes alternate approximate erect or spreading, spikelets  $\frac{1}{16}$  in. geminate or 3-5-nate, upper of each pair half as long as their pedicels elliptic acute, gls. membranous, I and II subequal 5-nerved, III elliptic-oblong acuminate pale. P. granulare, Trin in Spreng. Newe Entdeck. ii. 47; Spreng. Syst. i. 244; Kunth Enum. Pl. i. 50; Steud. Syn. Gram. 16. P. pedicellatum, Nees & Arn. in Wight Cat. 2310, & Herb. n. 3027; Iluthie Grass. N.W. Ind. 1. Milium capillaceum, Koen. ex Steud. Non. Ed. II, ii. 145. M. punctatum, Koen. in Herb. Mus. Brit. M. sanguinale, Roxb. Fl. Ind. i. 315 (excl. Syn. Burm). M. setaceum, Koen. in Herb. Banks.; Jucq. ex Trin. L.c. M. striatum, Herb. Ham. ex Wall. Cat. n. 8747 A.—? Paspalum, No. 3, Griff. Notul iii. 14 (in part), Ic. Pl. Asiat. t. 146, f. 1.—Panicum, Wall. Cat. n. 8747.

THEOUGHOUT INDIA, in the plains and low hills from the N.W. Provinces to Bengal. NILGHIEI HILLS, alt. 5000 ft., Beddome. UPPER BURMA, Collett.

Stem 6-18 in., branched from the base. Leaves 2-6 by  $\frac{1}{6} - \frac{1}{6}$  in., finely acuminate; ligule short, scarious. Spikes 3-10, 1-4 in., subterminal on the very slender peduncle, spreading; rachis capillary, trigonous; pedicels  $\frac{1}{3} \cdot \frac{1}{6}$  in.; gls. slightly hairy.—Munro identifies Griffiths' Pasp. 3 with this; it differs in the flattened rachis, red prostrate stem, and pule red spikelets, which I have never seen in pedicellatum. Roxburgh's excellent drawing (as Milium sanguinale) shows pale spikelets.

14. **P. jubatum**, Griseb. in Goett. Nachr. (1868) 84 (Gesamm. Abhandl. 301); erect, rather stout, leaves long, spikes very many lower whorled, spikelets  $\frac{1}{2}$  in. in scattered pairs pale or dark purple elliptic acute, gle. finely tomentose, I rather shorter than III 3-nerved, II 5-nerved, III elliptic-lanceolate acuminate.

The KHASIA HILLS; in wet places, alt. 5-6000 ft., J. D. H. & T. T., &c.

Stem 2-4 ft., shining, internodes long. Leaves 6-10 by 1-4 in., smooth; sheath very long; ligule short rounded. Spikes 4-7 in., very unequal; rachis slender,

trigonous. Spikelets subsessile; gls. thin, shining.—Pale spikes and spikelets occur on the same plant with the dark coloured.

15. **P. Perrottetii,** Hook. f., stem creeping below, spikes in a pyramidal panicle lower often whorled, rachis capillary, spikelets  $\frac{1}{20} - \frac{1}{16}$  in. oblong-lanceolate acute brown, upper of each pair long-pedicelled, gl. I and II subequal many-nerved, III elliptic-lanceolate acuminate. Panicum Wallichianum, Wight & Arn. in Wight Cat. n. 1607, Herb. 3085; Steud. Syn. Grom. 41; Thw Enum. Pl. Zeyl. 358; Trim. Uat. Ceyl. Pl. 104. Pan. multibrachianum, Hochst. ex Steud. l. c. 74. Pan. Perrottetii, Kunth Revis. Gram. ii. 395, t. 3; Enum. Pl. 1. 96. Milium minutiforum, Trin. Panic. Gen. 33.

NILGHIRI HILLS, Wight, &c., alt. 6000 ft., Lawson. CEYLON, in the Central Province, Thuastes.—DISTRIB N. Africa.

Very variable in height, 6-24 in, much branched below. Leaves 1-6 by \( \frac{1}{6} \)-\frac{1}{4} in, glabrous or c late; sheaths 1-1\( \frac{1}{2} \) in; ligule rounded, scarious. Panicle 2-3 in, peduncle filiform. Spikes crecto-putent, lowest \( \frac{1}{2} \)-\frac{1}{4} in., upper gradually smaller; rachis trigonous. Spikelets geninate, lower sessile or pedicelled.—The panicled inflorescence is very different from that of P. pedicellare.

#### DOUBTRUL SPECIES.

P. Geiffithianum, C. Mull. in Bot. Zeit. xxix. (1861) 325. "Foot of Khasia Hills, Griffith."—There is no Indian Paspalum that at all resembles the description of this, which, according to its author, is an ally of P. fluitans, Ell, and other American species. There is probably an error as to the habitat and collector.

#### 2. ERIOCHLOA, H. B. & K.

Annual or perennial grasses. Leaves flat. Spikelets secund on the spiciform branches of a raceme or panicle, base thickened and articulate on the thickened top of the short pedicel. Glumes 3, I and II subequal, membranous; III shorter, apiculate, hardened in fruit. Lodicules truncate. Stamens 3, anthers linear. Styles free. Grain oblong, free within the hardened glume.—Species few, tropical.

The thickened base of the spikelet alone distinguishes Eriochloa from Paspalum.

1. E. polystachya, H. B. & K. Nov. Gen. & Sp. i. 95, f. 31; spikes panicled, spikelets & in. long erect ovoid acute, gl. I & II silky or glabrous 3-5-nerved. Lam Encycl. t. 909; Kunsh Enum. Pl. i. 72, Suppl. 53; Trim. Cat Ceyl. Pl. 104, Duthie, Indug. Fodd. Grass. t. 41, Fodd. Grass. N. Ind. 2. E. annulata, Kunth Rev. Gram. i. 30, Enum. i. 73; Astchis Cat. Panjab. Pl. 158; Duthie Grass. N.W. Ind. 2; Benth. Fl. Hongk. 409, Fl Austral. vii. 463. E. punctata, Ham. Prodr. Fl. Ind. Occ. 5; Kunth Enum. i 72, Suppl. 54. Miq. Fl. Ind. Bat. iii. 441; Benth. Fl. Austral. vii. 462. E. sundaca, Miq. l. c. Suppl. 606. E. succincta, Kunth l. c. i. 73. Helopus annulatus, Nees in Mart. Fl. Bras. ii. 17; Wight Cat. n. 1605; Wall. Cat. n. 8750. H. Lævis, Trin. ex Spreng. Neue Enideck. ii. 49, fig. 4. H. pilosus, Trin Fund. Agrost. 10-1, fig. 4. H. acrotrichus, Steud. Syn. Gram. 100. Paspalum punctatum, Flueyge l. c. 127 (Paspalus), Trin. Sp. Gram. 10. Paspalum punctatum, Flueyge l. c. 133 (Paspalus); Trin. l. c. t. 133. P. succinctum, Trin. Diss. ii. 19; Sp. Gram. Ic. t. 156. Milium Carar & M. Languchinia, Herb. Ham. ex Wall. Cat. n. 8750, F G. M. polystachyum, Spreng. Syst. i. 251. M. punctatum, Linn. Amen. Acad. v. 392, Sp. Pl. 91; Br. Prodr. 188. M.

orixense, Roxb. Ic. ined. n. 818. M. ramosum, Retz. Obs. vi. 22; Roxb. Fl. Ind i. 316; Griff. Notul. iii. 15, Ic. Pl. Asiat. t. 139, f. 60. Piptatherum punctatum, Beauv. Agrost 18, t. 5, f. 1. P. confine. Schult Mant. ii. 184 (ex Kunth). P. annulatum, Raddi Agrost. Bras 30. Agrostis punctata, Lamk. Encycl. i. 58. Edipachne punctata, Link Enum. Hort. Berol i. 51.

PLAINS OF INDIA; from the Punjab to Bengal, Burma, Central India, and

southward to Malacca and CEYLON -DISTRIB. All hot countries.

Stems 1-5 ft., ascending from a creeping base Leaves 3-10 by  $\frac{1}{6}$ - $\frac{1}{6}$  in., glabrous or hairy, liqule very short. Spikes forming a narrow secun 1 compound paniels 2-6 in. long; rachis trigonous and branches pubescent villous or nearly glabrous. Spikelets shortly pedicelled; gl I and II usually silky, sometimes villous, III much shortest, punctulate, very shortly awned.

#### 3. ISACHNE, Br.

Perennial grasses. Spikelets small or minute loosely panicled, not or obscurely articulate with the pedicel, subglobose or obovoid, 1-2-fil. Glumes 4, often all separately deciduous from a minute rachilla; I and II subequal, convex, herbaceous, empty; III and IV palette, equal and both convex, or III larger flatter thinner; III male, rarely 2-sexual; IV articulate and often stipitate on the rachilla, hemispheric, coriaceous, fem. or bescual. Lodicules very minute. Stamons 3, rarely 4-6. Grain free within the hardened gl. and pale.—Species about 25, tropical and subtropical.

The 2-fld. spikelets not articulate on the pedicel, with usually subequal convex empty gls., and gl. IV being articulate on the rachilla, distinguish Isaohne from Panicum. I find great varieties in the persistence of the empty glume on the pedicel. Mr. Rendle informs me that he has seen traces of a fifth glume and palea in I. australis, which favours the claim of the genus to be referred to Panceæ, and he has shown me a most minute prolongation of the rachilla at the base of the palea of gl. IV in the same species. Many of the species so run into their allies, that I regard the following limitation of most as open to question. The smooth hispid or bristly empty gls. affords no specific character, nor does the glabrous or pubescent fl. gl.

- \* Spikelets 20-10 in long.
- + Glumes I and II longer than IV, cuspidate or acuminate.
- 1. **I. Kunthiana**, Wight & Arn. in Wight Cat. n. 1659; Thw. Enum. Pl. Zeyl. 362; stem 6-10 in. more or less hairy, leaves ovate or ovate-colong, paniele 2-2\frac{1}{2} in., branches few, gl. I and II subacute or subcuspidate 7-9-nerved. Miq. Fl. Ind. Bat. iii. 460; Trim. Cat. Ceyl. Pl. 104 I. dispar, Herb Wight. I. Metzii, Hochst in Hohen. Pl. Ind. Or. n. 1276. I Neesiana, Arn. ex Steud. Syn Gram. 96. Panicum cuspidiglume, Steud. Kunthianum, Wight & Arn. & Metzii, Hochst. ex Steud l c 98, 95. P. obliquum, Moritz. ex Mig. l. c., Steud. l. c. P. Burmauni, et P. marginatum, var. Heyne ex Wall. Cat. n. 8734, A.

NILGHIEI and TRAVANCORE HILLS, alt. 6-8000 ft., Hoyne, &c. SINGAPORE,

Ridley. OBYLON; in elevated districts .- DISTRIB. Java, Borneo.

Stem ascending, geniculate, branched. Leaves \(\frac{1}{2}-2\frac{1}{2}\) in, striate, spreading, smooth or scabernlous above, base cordate, midrib and nerves obscure; ligule of hairs. Panicle 2-2\frac{1}{2}\) in.; branches short, rather stout, at length horizontal, pubescent or glabrous. Spikelets \(\frac{1}{20-1}\frac{1}{6}\) in., very shortly pedicelled; gl. I and II smooth

hispid or bristly; III and IV subequal or III rather the largest, glabrous or puberulous.—I. Neesiana, is rather more glabrous, and has rather more unequal gls. III and IV, but these characters are too variable to found a distinct variety upon.

Var. latifolia; stem 12-16 in. stouter, leaves 2-3 by  $\frac{1}{2}$ - $\frac{3}{4}$  in. and sheaths sparsely hairy, midrib and 2-3 pairs of principal nerves distinct.—Nilghiri Hills, alt. 6000 ft., Lawson; Anamallay Hills, Beddome.—Almost intermediate between

I. Kunthiana and elatror.

2. **I.** elatior, Hook f.; nearly glabrous, stem 2-4 ft., nodes tomentose, leaves 3-4 in. ovate-lanceolate acuminate thin scabrid above, panicle 5-7 in., branches many slender, gl. I and II subcuspidate 5-9-nerved.

CEYLON, Gardner; Newera Ellia, Thwaites (CP. 314).

Included by Thwaites under I Kunthiana, possibly correctly, but a very different looking plant, from its great size, thin leaves and much larger many-fid panicle, with longer branches.

3. **I. Lisboæ**, *Hook. f*; glabrous, stem creeping, branches ascending, leaves thin oblong-lanceolate, panicle with few horizontal stout hispidly setulose branches, gl. I and II 5-nerved hispid, III and IV equal.

The CONCAN; Mahableshwar, Lisboa.

Stem creeping for several inches with long wiry roots, then ascending, and 6 in. high, rather stout. Leaves 1-2 in. by  $\frac{2}{3}$  in., recurved, thin, acute or obtuse, finely striate; base rounded, margins ciliate; sheaths loose; liquide 0. Panicle with the inchis quite smooth. Spikelets  $\frac{1}{10}$  in. diam., secund on the lower surface of the branches, sessile or shortly pedicelled; gl. I and II hemispheric, 5-libbed, tip obtusely cuspidate, a little larger than III which is glabrous.—I have seen but one specimen of this species, which probably varies like its congeners in the smoothness or hispidity of the spikelets. The 5-ribs of gl. I and II are good characters.

- ++ Glumes I and II much shorter than IV.
- 4. I. multiflora, Trim. Cat. Ceyl. Pl. 104. I. australis, var. multiflora, Thw. Enum. Pl. Zeyl. 361.

CRYLON; Oova district, alt. 5000 ft., Thwaites.

- Stem 1-2 ft. or more, branched, and sheaths smooth. Leaves 4-6 by  $\frac{1}{4}$ - $\frac{1}{4}$  in., smooth, deeply striate, margins hardly thickened, nerves obscure. Panicle 4-7 in.; branches many, long, suberect, and very short pedicels subcapillary. Spikelets  $\frac{1}{20}$  in., glabrous, glistening, purplish; gl. I oblong-ovate, 7-nerved; II as long, glabrous; III oblong-lanceolate, empty; IV much shorter, broadly oblong, obtuse, glabrous.
  - ††† Glumes I and II about equalling IV.
- § Glumes III and IV usually equal and similar, both hemispheric and coriaceous.
- 5 **I-albens**, Trin. Sp. Gram. Ic. t. 25; tall, erect, leaves and sheaths smooth, panicle large pyramidal effuse, spikelets  $\frac{1}{2} \frac{1}{0} \frac{1}{16}$  in. rather shortly pedicelled, globose. Kunth Enum Pl i. 137; Mrq. Fl. Ind. But. iii. 459. Duthie Grass. N W Ind 2 (excl. Syn.), Fodd. Grass. N. Ind. 3. Panicum albens, saxatile & Zollingeri, Steud. Syn. Gram. 96, 97.—Isachne, Wall. Cat. D. 8658.

TEMPERATE and SUBTROPICAL HIMALAYA and the KHASIA HILLS, alt. 2-6000 ft. from Simla eastward; ascending to 9000 ft. in Sikkim. Burma, Griffith. Perak, alt. 4600 ft. Wray.—Distrib China, Malaya.

Stem 1-4 ft., branched. Leaves 2-8 in., very variable (1-1 in.) in width, linear

or linear-lanceolate, glabrous or sparsely hairy beneath; margins thickened, scaberulous; midrib and 3-5 pairs of principal nerves distinct, mouth of sheath chate Panvile 3-14 in. long, branches and pedicels capillary; gl. I and II obtuse, glabrous or sparsely setulose, usually pale green, faintly many-nerved, III and IV glabrous or pubescent, both often bisexual.

Var. hirsuta; leaves broad, sheaths hirsute. - Isachne, Wall. Cat. n. 8657. -

Silhet, de Silva. Cachar, Keenan.

6. **I. scabrosa**, *Hook. f.*; leaves subsrect, sheaths scabrid, panicle 2-3 in, pyramidal, spikelets  $\frac{1}{10} - \frac{1}{16}$  in.

KHASIA HILLS, alt 4500-5000 ft. Clarke.

Stem rambling below, then subcreet, 1-3 ft., stiff, sparingly branched. Leaves 3-6 by \$\frac{1}{2}\$-\$\frac{1}{2}\$ in., linear-lanceolate, scabrid on both surfaces, pale and strongly-nerved beneath, margin thickened; mouth of sheath sparingly ciliate Panicle very shortly pedinched; branches erecto-patent, 1-1\frac{1}{2}\$ in. long, pedicels capillary, smooth, tips not swollen. Spikelets sparsely setulose, tips rounded; gl. I and II glabrous or sparsely setose, many-nerved.—Ensily distinguished from P. albens and hima'acca by the scabrid leaf-sheaths; but most nearly allied to the latter.

7. I. himalaica, Hook. f.; erect, leaves linear or linear-lanceolate strict scaberulous above, margins slightly thickened, sheaths smooth, paniele pyramidal, spikelets [a-1] in globose, pedicels long capillary tips hardly thickened, gl. I and 11 taintly many-nerved. I. australis, Aitchis. Cat. Punjab. Pl. 761; Herb. Ind Or. If & T. (the Khasian plant); Duthie Grass. N.W. Ind. 2, Foodd. Grass N. Ind. 3. I. muricata, Munro in Herb. Strach. & Winterb. No. 2 Planicum montanum, Duthie Grass N.W. Ind. 4.—Isachne, Wall. Cat. n. 8656, D. E.

WESTERN TEMPERATE and SUBTROPICAL HIMALAYA; in wet places, ascending to 6000 ft.; Kumaon, Stiach. & Winterb. Nepal, Wallsch. Perhawur, Attcheson. Rajaobi, Jacquemont. Khasia Hills, in marshes, alt. 4-5 00 ft. common.—Distrib. Afighanistan.

Stem 1-2 ft., erect from the base, stout or slender, stiff. Leaves always narrow (\frac{1}{2}\) in.), nearly ensiform; nerves 9-11 part, usually very strong, margins thickened; mouth of sheath stiffly chate Pancle with erecto-patent brunches 1-1\frac{1}{2}\) in. long. Spikelets green or purplish; gl I and II glabrous scabrous or bristly, III sometimes longer and flatter than IV.—Very like I. australis, but a larger and more rigid plant, with gl. II and III usually equal, and both hemspheric.

In a note in Munro's herbatium this is referred to the Javan I. virgata, Nees (Miq. Fl. Ind. Bat. in. 462 = Pancum rhabdinum, Stend.), but that is described as being fastigiate spikelets, and glumes with narrowed obtuse mucronate points. It

closely resembles a Samatran plant from Beccari (n. 198).

8. **I. elegans**, Dalzell mss.; erect, tufted, flaccid, glabrous or nearly so, leaves 2-5 in. very narrowly linear acute soft smooth on both surfaces or scaberulous above, margins thickened, panicle subsessile contracted, branches erect, spikelets  $\tau_{12}^1 - \tau_{10}^1$  in. pedicels short, tips rounded, gl. I and 1I many-nerved.

The CONCAN, Dalzell, Stocks, in wet places between Poonah and Carli, Jacque-

mont (n. 143), Woodrow (n. 175).

Stems 8-12 in., densely tutted, soft. Leaves 1-1 in. broad, principal nerves 0 or 1-2 on each side, margins thickened, smooth or seriulate, rarely with a few scattered bristles beneath; sheath quite smooth, mouth cluate. Panicle 3-5 in., glabrous; branches 1-1 in., smooth; pedicels rarely longer than the spikelets, which are hispid green or blueish, gls. III and IV pubescent, usually equal and both hemispheric, but III sometimes longer and flatter.—Fire tufted flaccid habit is quite unlike I. australis, but may be due to local conditions.

9. **I. javana**, Nees ex Miq. Pl. Jungh 376, & Fl. Ind. Bat. iii. 462; stout, erect, leaves 2-3 in. acute or obtuse stiff glaucous beneath, margins much thickened, paniele lax, branches and pedicels very long and slender tips obconic, spikelets obovoid  $\frac{1}{4} - \frac{1}{12}$  in. long. Panicum batavicum, Steud. Syn. Gram. 96.

UPPER BURMA, Herb. Hort. Calcutt. MALACCA, Maingay; Mt. Ophir, T. Lobb, Hullett. Perak; on Gunong Bubu, alt. 5000 ft. Wray.—DISTRIB. Java, Borneo.

Habit of I. himalaica. Stem 2-3 ft., quite smooth, stiff; nodes ciliolate. Leaves erect or erecto-patent, strict, nearly smooth on both surfaces, or sparsely hairy beneath, with 9-11 pairs of often very obscure nerves, margin smooth or servulate; sheaths quite smooth, margins glabrous or ciliate, mouth bearded. Panicle 2-4 in., glabrous, lower branches 2-3 in.; pedicels more thickened at the tip than in most other species. Spikelets broad, smooth; gl. I and II often polished; nerves many, obscure; III and IV usually equal and both hemispheric; III rarely larger and flattened, usually male; IV fem or bivexual; sometimes both III. and IV. are triandrous or hexandrous, in one spikelet III was triandrous and IV tetrandrous.—A much larger plant than I. australis.

10. **I. Clarkei**, Hook. f.; stem short very slender, leaves 1-2 in. ovate-lanceolate acute very thin, margins thickened serrulate, panicle 2-3 in. pyramidal, branches horizontal and pedicels capillary tips slightly thickened, spikelets  $\frac{1}{3} - \frac{1}{3} - \frac{1}{3}$  in.

SIRKIM HIMALAYA; meadows in the Lachoong valley, alt. 8-11,000 ft.— J. D H. Munnipore; on Kohima, alt. 5800 ft. Clarke.

Stems 6-12 in., almost filiform, base prostrate. Leaves spreading, almost membranous, nerves many faint, midrib obscuie; sheath and its mouth often strongly ciliate. Paniele long-peduncled, branches 1 in. and less. Spikelets scattered, hispid, green or purplish; gl. IV. hispidly pubescent.—Apparently a distinct little species with very small spikelets, but possibly a small state of I. albens.

11. **I. rigida**, Nees ex Steud. Syn. Gram. 95; stems rigid much branched from the base, leaves  $\frac{1}{2}$ -1 in rigid spreading and recurved ovate to ovate-lanceolate almost pungent scabrid base cordate margins thickened, panicle small pyramidal glandular, spikelets few  $\frac{1}{2}$  in., pedicels long slender tip subclavate. Miq. Fl. Ind. Bat. in. 461. I. Myosotis, Benth. Fl. Hongk. 415 (not of Nees). Panicum rhignon, Steud. l. c. P. piluliferum, Nees ex Steud. l. c. 24 (fide Herb. Munro).

Tenasserim, Helfer. Nicobar Islds., Kurz.—Distrib. Java, Borneo, China. Stems 6-16 in., generally very long decumbent and naked below, internodes 1-1½ in., naked. Leaves deeply striate, with finely acuminate account tips, margins smooth cilolate or serrulate; sheaths ¼ in., smooth scabrid or bristly. Panicle 1 in., peduncle stout; branches horizontal. Spikelets few, hispid; gl. I and II manynerved, III and IV glubrons—I take this to be the Javan I. rigida, Nees, from Steudel's description. It further agrees well enough with the descriptions of I. firmula and I. monticola, Buese.

- §§ Glume III usually flatter and thinner, and often longer than IV.
- 12 **I. australis**, Br. Prodr. 196, stems tufted ascending, leaves short lanceolate or linear-lanceolate acute margins not or very slightly thickened, sheath smooth, panicle ovoid or pyramidal, spikelets globose  $\frac{1}{14} \frac{1}{12}$  in. glabrous or setose, tips of pedicels hardly thickened. Kunth Enum. Pl. i. 136; Thrv. Enum. Pl. Zeyl. 361 (in part, excl. Syn.); Trim. Cat. Ceyl. Pl. 104; Miquel Fl. Ind. Bat. iii. 461; Benth. Hl. Hongk. 414, Fl. Austral. vii. 625; Hook. f. Handb. N. Zeal. Fl. 324; Buchan. Grasses

N. Zeald. t. 12; Bailey Grasses Queensl. t. 1; Franch. & Sav. En. Pl. Jap. 11. 164. I. atro-vivens, Trin Gram. Panic 251. I. lepidota, Steud. in Flora, xxix. (1846) 19; Walp. Ann. i. 924 Panicum antipodum, Spreng. Syst. i. 314; Steud. Syn. Gram. 94. P. atro-vivens, Trin. ex Spreng. Neue Entdeck. 11. 88, Syst. Veg. i. 318; Kunth l. c. 127. P. australis, Rasp. in Ann. Sc. Nat. v. (1825) 299. P. lepidotum, Steud. in Flora, xxix. (1846) 19. P. nodibaibatum, Hocht. Pl. Hohenack. n. 127; Steud. l. c. 95. P. violaceum, Kleine ex Thiele in Linnea, ix. (1831) 307. Aira ischæmoides, Koen ex Kunth l. c. 127. Milium globosum, Thunb. Fl. Jap. 49.—Isachne, Wall. Cat. n. 8656, A B C F.

Hotter parts of INDIA, from Assam and Burma to Central India and south-

ward to CEYLON .- DISTRIB. Austral, N. Zeald.

Stem 8-18 in. from a creeping branching base; nodes glabrous or sparsely bearded. Leaves 1-3 in., rarely more, subscaberulous above or on both surfaces, margins cilcolate, nerves 0 or 2 3 very slender pairs, midrib obscure; sheaths smooth mouth and often margins ciliate. Panicle 1-3 in., contracted and ovoid or pyramidal and open; branches glabrous or obscurely scaberulous, and as the pedicols very viriable in length. Spikelets green or purplish, obtuse, smooth and polished or scabrid or setulose; gl. I and II faintly many-nerved; III and IV usually very unequal, III longer, flatter, thinner, shining; IV coriaceous, glabrous or pubescent, orbicular or broadly ellipsoid.—I. mauritiana, Kunth, is a very closely alhed species, but has gl. III and IV equal and similar; it is Panicum dubrum and biflorum, Lamk.

Var. effusa, Trim. Ca. Ceyl. Pl. 104; panicle pyramidal, brunches longer, and pedicels spreading capillary, spikelets rather smaller.—Ceylon; Peradeniya, Trimen.

13. I. miliacea, Roth Nov. Pl. 58; stems very slender prostrate widely creeping and branched below then ascending, leaves small ovatelanceolate acute margins not or faintly thickened, panicle small contracted or spreading lax-fid. spikelets \(\frac{1}{2}\)\_0^{-1}\); in., pedicels short tips hardly thickened. Kunth Enum. Pl. i. 136; Miq Fl. Ind. Bat. ii. 459 (excl. some syns.). I. Meneritana, Poir. Encycl. Suppl. ii. 185 (excl. Syn); Br Prodr. 196. I. minutula, Kunth Revis. Gram. ii. t. 117, Enum. Pl i. 137, Suppl. 99. I. adstans, Miq. l. c. 461. I. polygonoides, Doell in Mart. Fl. Bras. ii. II 273 I. geniculata & stigmatosa, Griff. Notul. iii. 41, 42, Ic. Pl. Asiat. t. 139, f. 206, 148, f. 2. Panicum squatum. Nees ex Steud. l. c. 98. P. adstans, Steud. l. c. 94. P. Benjamini, Steud. l. c. 96, ex Mig. l. c. 459. P. Meneritana, Spreng. Syst. i. 321. P. minutulum, Gaud. in Freyc. Voy. Bot. 410; Steud. l. c. P. polygonoides, Lam. Encycl. iv. 742; Decree in Nouv. Ann. Mus. Par. ii. 352. P. patens, Roxb. Fl. Ind. i. 305; Kunth l. c. 126; Hohenack. Pl. Ind. Or. n. 202 P. gonatodes, Steud. l. c. 95. Neurachne Meneritana, Roem. & Sch. Syst. ii. 475 (excl. syn.). Aira cœrulea, var. Herb. Heyne.—Isachne, Wall. Cat. n. 8655.

Low marshy ground, from the SIKKIM TERAI, BENGAL and SILHET to BURMA and southward to MALACCA, the NICOBAR ISLDS., and CEYLON.—DISTRIB. China,

the Malay and Pacific Islds., S. America.

Very variable in size; stem rarely 6-8 in. high, nodes of stem glabrous or ciliate; sheaths glabrous or sparsely hairy. Leaves flaccid or rather stiff, usually spreading, nerveless or nearly so, glabrous or sparsely hairy on both surfaces. Spikelets as in I. australis, but usually smaller, glabrous, rarely sparsely setose; gl. I and II 5- or more-nerved; IV glabrous or pubescent.—The small states of this plant look very different from typical I. australis, but larger appear to unite them by many intermediates. Trimen refers I. Meneritana to I. australis, Mr. Rendle, who has carefully compared the types of each in the British Museum, agrees with me that it goes best with miliacea. He also informs me that Burman's Thes.

- Zeyl. 110, t. 47, f. 3, is not an Isachne, but resembles an Eragrostis; and that Plukenet's Phyt. t. 300, f. 2. (in Herb. Sloane) is E. celear is from the Malabar Coast. Trimen has pointed out (Journ. B.t. xxiii. (1885) 271) that the "Meneritana of the Cingalese is not an Isachne, but is applied to Panicum miliare and psilopodium.
- 14. I. dispar, Trm. Sp. Gram. Ic. t. 6; stem short ascending from a branched creeping base, leaves 1-1 in. ovate-cordate to lanceolate acuminate scaberulous margins thickened, paniele oblong at length pyramidal, spikelets 14-11 in, pedicels short tips thickened. Kunth Enum. Pl. 1. 136; Duthie Grass N.W. Ind. 2; Miq. Fl. Ind Bat. 11. 460. I. muricata, Nees in Wight. Cat. (ex Mig. l.c.). Panicum dispar, Steud. Syn. Gram. 96. PP. muricatum. Retz. Obs. v. 18.

NEPAL, Wallich. SIKKIM TERAI, Clarke. RAJPOOTANA, on Mt. Aboo, King. Duthie. NILGHIEI HILLS, alt. 5000 ft. Clarke.

Stems 2-6 in. Leaves spreading, rather rigid, striated; midrib slender. Spikelets as in I australis; pedicels smooth or rough; gl. I and II scabrid or setulose, nerves many, funt; III glabrous; IV pubescent.—This again is perhaps a var. of I. australis, of lower stature with more rigid scaberulous strongly margined leaves, sometimes ciliate at the base, and smaller panicles with shorter pedicels.

- \*\* Spikelets 1-1 in. long.
- 15 I. Walkeri, Wight & Arn. ex Thw. Enum. Pl Zeyl. 361; tall, slender, leaves linear-lanceolate acuminate margins thickened, panicle very lax branches and pedicels very long capillary, gls. I and II subequal 7-9-nerved. I. mlagirica, Hochst. Pl. Hohenack. n. 1280; Trim. Cat. Ceyl. Pl. 104. Panicum Walkeri, Steud. Syn. Gram. 97.

NILGHIRI HILLS; Khoondah Ghat, Waght; Concor, alt. 6000 ft., Clarke, &c. CEYLON; forests of the Central Province, Walker, Thwaites (C.P. 282)

Stem 2-3 ft., as thick as a crow-quill, decumbent below. Leares 4-6 by 1-1 in., rigid, smooth above, hairy beneath with a distinct midrib and 3-5 pairs of primary nerves, base narrow rounded; sheath smooth, margins above and mouth bearded. Panicle 8-12 in.; branches 11-3 in., sparingly divided. Spikelets 1-5 in, few, very distint; gl. I and II persistent, oblong, obtuse; III and IV oblong, obtuse, glabrous.

16. I. Gardneri, Benth. in Gen Pl. iii. 1100; tall, slender, leaves lanceolate acuminate margins hardly thickened, panicle very lax, branches and pedicels very long filiform, gl. I much shorter than II 3-nerved, II 5-nerved. I. nilagirica, Trim. Cat. Pl. Ceyl. 10-1 (non Hockst.). Panicum Gardneri, Thw. Enum. Pl. Zeyl. 359.

NILGHIEI HILLS; Madawattan, alt. 6000 ft., Lawson. Anamallay Hills, Beddome. CEYLON; Central Provinces, alt. 4-6000 ft., Gardner, Thwaites, &c.

Stem 2-3 ft., slender, quite smooth, decumbent below. Leuves 2-3 by \frac{1}{2}-\frac{3}{2} in., thin, glabrous or sparsely hairy beneath, base broad cordate, principal nerves 3-4 pairs, very slender; mouth of sheath cultate. Panicle with widely spreading sparingly divided branches; tip of pedicel thickened. Spikelets 1-1 in., few, distant, oblong; gl. I and II obtuse glabrous or sparsely setose, I ovate; II ovate-oblong; III and IV elliptic-oblong, acute, quite smooth.

### 4. PANICUM, Linn.

Annual or perennial grasses. Leaves various Spikelets small, 1-2-fld., terete or dorsally or laterally compressed, articulate on their pedicels, very rarely awned, never silkily villous; glumes 4, I and II empty, epaleate;

- II. Branchlets of panicle often produced beyond the terminal spikelet into a rigid awn-like brisile.
- Sect. VII. PTYCHOPHYLLUM. Spikelets solitary, sessile or pedicelled on the slender branches of a decompound open panicle. Leaves plicate. (See also Setaria Forbesiana.) (Sp. 48, 49.)
  - B. Spikelets strongly laterally compressed.
- Sect. VIII. Gibbosz. Spikelets very minute, panicled; gl. IV semilunar. Perennial very slender grasses. (Sp. 50-54.)
- Sect. IX. Pseudechinolæna. Spikelets rather large, distant, subsessile on a slender simple or sparingly divided rachis, often glandular. (Sp. 55.)

#### Sect. I. Paspaloideæ. (See p. 27.)

1. P. Isachne, Roth Nov. Sp. 54; spikes many longer than the internodes, spikelets is in. suberect oblong acute villous, gl. I minute, II and III equal faintly 3-nerved, II = IV, III paleate empty, IV oblong rounded at both ends quite smooth. Roem. & Sch. Syst. ii. 458; Schult. Mant. ii 252; Kunth Enum. Pl. i. 97; Steud. Syn Gram. 57. P. eruciforme, Sibth. Fl. Græc i. t. 59; Sibth. & Sm. Prodr. Fl. Græc i. 40; Roem. & Sch. l. c. 426; Kunth l. c. 78; Thw. Enum. Pl. Zeyl. 359; Trim. Cat. Ceyl. Pl. 104; Duthie Grass. N. W. Ind. 3, Indeq Fodd. Grass. t. 43, Fodd. Grass. N. Ind. 6; Baker Fl. Maurit 434; Parlat. Fl. Ital. i 119; Boiss. Fl. Orient. v. 437. P. Koenigu, Herb. Wight ex Nees Fl. Afr. Austr. 30. P. caucasicum, Trin. in Mem. Acad. Petersb. Ser. 6 (1835) iii. 237, Sp. Gram. Ic. t. 262, Panic Gen. 149: Steud. l. c. P. Crus Galli. Roxb. ex Wight Cat. n. 1616 (non Fl. Ind.) P. pubinode, Hochst. ex A. Rich. Tent. Fl. Abyss. ii 363; Steud. l. c. 57. P. Wightianum, Arn. & Nees. ex Nees Fl. Afr. Austr. 30. P. Wightii, Nees l. c. 29; Trin. Pan. Gen. 148; Steud. l. c. 58. Brachiaria eruciformis, Griseb. in Ledeb Fl. Ross. iv. 469. Echnochloa eruciformis, Reichb. Ic. Fl. Germ. t. 29; C. Koch, in Linnæa, xxi. (1848) 437.—Panicum, Wall Cat. n. 8693.

Plains of India; in watery places, from Kashmir, alt. 6000 ft., and the Panjab, to Bengal, and southward to CEYLON.—DISTRIB. Westward to Italy and N. Africa.

- Stems 1-2 ft, slender, ascending from a decumbent base, much branched; nodes often bearded. Leaves  $1-2\frac{1}{2}$  in. by  $\frac{1}{4}-\frac{1}{3}$  in., glaucous, linear-lanceolate, acuminate, flat, glabrous or softly hairy, base rounded; mouth of sheath with long hairs. Spikes 8-12,  $\frac{1}{4}-1$  in. long, erect or subcrect; rachis narrower than the spikelets, cliate. Spikelets subsessile, very pale; gls. membranous, I cordate; II about  $\frac{2}{3}$  shorter than IV, which is white
- 2. P. flavidum, Retz. Obs. iv. 15; spikes erect shorter than the internodes, spikelets  $\gamma_{6}^{-1}$  in. divaricate gibbously globose glabrous, gl. I = about  $\frac{1}{2}$  III suborbicular 3-nerved, II nearly = IV 7-nerved tip rounded, III oblong obtuse 3-5-nerved paleate neuter, IV broadly ovate cuspidate reticulately punctulate. Br. Prodr. 190; Kunth Revis. Gram. i. 211, t. 17, Enum. Pl. i. 78, Suppl. 60; Trin. Panic. Gen. 151; Nees Agrost. Bras. ii. 116; Griff. Notul. iii. 33, Ic. Pl. Asiat. t. 139, fig. 67; Duthie Grass. N.W. Ind. 3, Indig. Fodd. Grass. t. vi, Fodd. Grass. N. Ind. 7; Wight Cat. n. 1613, & Herb. n. 3059; Wall. Cat. n. 8692 (excl. B, & H

partim); Benth Fl. Austral. vii. 474. P. brizoides, Jacq. Eclog. Gram 2, t. 2; Trin. Dies. ii. 128, Sp. Gram. Ic. t. 158, 159; Kunth Enum. Pl. i. 78; Roxb. Fl. Ind. i. 293; Dalz. & Gibs. Bomb. Fl. 290; Thw. Enum. Pl. Zeyl. 359; Trim. Cat. Ceyl. Pl. 159; Duthie Grass. N.W. Ind. 2; Mig. Fl. Ind. Bat. iii. 445; Aitchis. Cat. Panjab Pl. 159; Nees Agrost. Bras 115; Baker Fl. Maurit. 433. P. distans, Trin. Sp. Gram. Ic. t. 172. P. brizoides, var. distans, Trin. Ic. t. 159 B. P. flaccidum, Koen mss. in Herb. Mus. Brit. P. floridum, Royle Ill. Bot. Himal. 420. P. granulare, Lam. I/l. i. 170, Encycl. iv. 740; Trin. Diss. ii. 129. P. Sama, Ham. ex Wall. Cat. 8692 F.

Plains of India; in watery places from the Panjab to Assam and Burma, ascending to 5000 ft. in Nepal and Kumaon, and southward to CEYLON.—DISTRIB. Trop. Asia and Africa.

Stem 1-4 ft., compressed, leafy, branched from the decumbent base. Leaves bifations, 3-5 by  $\frac{1}{6}-\frac{1}{4}$  in., linear-lanceolate acuminate, or ligulate with a rounded tip; sheaths compressed, lower tunid, mouth harry; ligule 0. Spikes few or many, distant,  $\frac{1}{2}-1$  in. Spikelets 2-20, very pale, sessile. Glumes membranous, white with green nerves; III neuter or male; 1V sometimes almost orbicular, white or brownish, very minutely lough.—The var. distans of Trinus is a depauperate state, and occurs on the same plant as the normal. A still more depauperate form, densely tufted, with stems and leaves 2-3 in. long and very few spikelets, is Wall. Cat. 8692 D from Herb. Wight, also found in Bengal. Mr. Rendle informs me that the name favidum may be a mistake for flaccidum, under which Koenig sent it to Retzius from Herb. Mus. Brit. where it is named flaccidum.

3. **P. punctatum**, Burm. Fl. Ind. 26; spikes longer than the internodes tip usually excurrent setiform, spikelets  $\frac{1}{20-16}$  in. plano-convex erectopatent glabrous, gl. I very short truncate, II = about half IV suborbicular 3-uerved tip rounded or truncate, III ovate acute 3-5-nerved neuter, IV ovate cuspidately acuminate granulate. P. fluitans, Retz. Obs. 111. 8 (not v. 18); Roxb. Fl. Ind. i. 293; Griff. Notul. iii. 25, Ic. Pl. Asiat. 139, f. 231; Dalz. & Gibs Bomb. Fl. 290; Thw. Enum. Pl. Zeyl. 339; Trim. Cat. Ceyl. Pl. 104; Aitchis. Cat. Panjab. Pl. 159; Duthie Grass. N.W. Ind. 4, Indig. Fodd Grass. t. 44, Fodd. Grass. N. Ind. 7; Baker Fl. Maurit. 433; Boiss. Fl. Orient. v. 437; Sleud. Syn. Gram. 59; Nees Agrost. Bras. 115. P. bitzoides, Retz. l.c.; Rottl. in Naturf. rl. Ges. Neue Schrift. Iv. (1803), 211; Wall. Cat. n. 8690, Wight Cat. n. 1614. P. fluitans, Herb. Madr. Wall. Cat n. 8692 B. P. granulare, Boyer Hort. Maurit. 364. P. mucronatum, Roth Nov. Sp. 45; Steud. l. c.; Nees Agrost. Bras. 116. P. paspaloides, Wall. l. c. n. 8691 A (partim), B.

Marshes throughout India, from the Panjab to Assam, and southwards to Malacca and CEYLON.—DISTRIB. Malaya, Mauritius, trop. and N. Africa.

Perennial, quite glabrous. Stem 2-4 ft., base floating, rooting at the nodes; lower internodes very stout, spongy. Leaves 4-8 in., linear, acute or acuminate; lower sheaths dilated; ligule a ring of hairs. Spikes many, \(\frac{1}{2}\)-1 in., distant, sessile, secund, appressed to the glabrous rachis, very pale; rachis about \(\frac{1}{6}\) in. broad, margin quite smooth, tip free acicular as long as the upper spikelet. Spikelets \(\frac{1}{12}\)-\(\frac{1}{16}\) in. long, imbricate, sessile, ovate-oblong. Glumes membranous, IV as long as III.—Mr. Rendle informs me that he has examined in the British Museum the specimen (in Herb. Sloane) on the figure of which Burman founded P. punctatum, and that it is the same as P. fluitans, Retz. And further, that the name fluitans is a ms one of Koenig, and was no doubt sent by him to Retz, who says that he received the plant from Koenig. As to the rival claims of punctatum and fluitans for adoption, the former (published in 1768) has a quarter of century's priority; but whereas the P. fluitans has had more than a century of recognition in all countries, P. punctatum

has never till now been recognized, nor could it have been from Burman's description only. Under these circumstances, and taking into consideration the facts, that Retz described two different plants under the name of fluitans, and that punctatum has been applied to no other species, I have adopted the latter.

4 P. paspaloides, Pers. Syn. i. 81 (paspalodes); spikes erect longer than the internodes, spikelets \( \frac{1}{20} - \grace{1}\sigma \) in. erecto-patent subglobose glabrous, gl. I very short suborbicular retuse, II nearly = IV strongly 5-nerved tprounded, III broadly ovate acute 5-nerved paleate neuter, IV oblong subacute nearly smooth. Kunth Enum. Pl 1.77; Trin Pan. Gen. 153. Wall Cat. 8691 (in part); Steud. Syn. Gram. 60; Boiss. Fl. Orvent. v. 436. P. affine, Nees Agrost. Bras. 113. P. appressum, Doell in Mart Fl. Bras. ii. II 184. P. beckmanniæforme, Mikan ex Trin. in Spreng. Neue Entdeck. ii. 83; Spreng. Syst. i. 309. P brizæforme, Presl Rel. Hænk. 302; Steud l. c. 60. P. brizoides, Lamk. Ill. i. 170 (not Trin. or Jacq). P. carnosum, Saltzm. ex Steud. l. c. P. fluitans, Retz. Obs. v. 18; Mig. Fl. Ind. Bat. 111. 455. P. numidianum, Sieb. ex Schult. Mant. ii. 267 (not Lamk.) P. truncatum, Trin. Diss. ii. 130, Sp. Gram. Ic. t. 168 (not t. 172) Paspalum adpressum, Pers. Syn. i. 85, Rich. ex Lamk. l. c. 176. Digitaria affinis, Roem. and Sch. Syst. 11. 470.

Kumaon, Strachey & Winterbottom, alt. 5000 ft. Upper Gangetic Plain; Delhi, Clarke. Bundelkund, Duthie. Scind, the Concan, Malabar and Tranquebar, Heyne, &c. Ceylon, Walker, &c.—Distrib. Affghanistan, Arabia, Afric. and Amer. trop

Perennial, stem glabrous; prostrate, usually floating below and rooting at the nodes. Leaves spreading, linear, acuminate acute or obtuse, lower sheaths dilated. Spikes \( \frac{1}{2} - 1 \) in, appressed to the narrow, compressed, setulose rachs. Spikelets subsessile, turgid. Glumes membranous—Hubit of P. punctatum, which it closely resembles, but differs in the rachis of the spikes not produced at the tip with a few imperfect terminal spikelets, in the size of gl. II, in paleate III, and smooth IV.—P. brizoides, Lamk., is the earliest name, but it has been so promiscuously applied that it is better abandoned.

# Sect. II. ECHINOCHLOA. (See p. 27.)

5. P. Crus-galli, Linn. Sp. Pl. 56; stem erect, leaves linear flat glabrous or scaberulous, raceme contracted or pyramidal, spikes many 2-4 in. often secund simple or subcompound, rachis setulose, spikelets \( \frac{1}{2} - \frac{1}{5} \) in (excl. awn) subglobose hispid or scabrid rarely glabrous, gl. I = \( \frac{1}{2} - \frac{1}{5} \) ill acute 3-5-nerved, II = III mucronate or shortly awned, III paleate male or neuter awned, awn short or long rigid scabrid, IV ovoid obtuse or cuspidate and palea coriaceous shining white. Fl. Dan. t. 852, & t. 1564; Host Gram. Austr. ii 15, t. 19; Encycl. Bot. t. 276; Knapp Gram. Britt. t. xi; Reichb. Ic Fl. Germ. t. 29; Trin. Sp. Gram. Ic. t. 161, 162; Wall. Cat n. 8687 (excl. I); Thue Enum. Pl. Zeyl. 359 (excl. Syn. colonum); Trim. Cat. Ceyl. Pl. 104; Duthre Grass. N.W. Ind. 3, Indig. Fodd. Grass. t. 5, Fodd. Grass N. Ind. 4; Miq. Fl. Ind. Bat. iii. 464; Benth. Fl. Hongk. 411, Fl. Austral. vii. 479; Boss. Fl. Orent. v. 435; Franch. & Sav. En. Pl. Jap. ii. 160; Griseb. Fl. Brit. W. Ind. 546. P. Burmanni, Bieb. Fl. Taur Cauc. iii. 57, ex Link. Hort. Berol. i. 204. P. corvipes, Stokes Bot. Mat Med. i. 141. P. digitatum, Gilib. Exercit. 517. P. dubium, Sieb. ex Steud. Nom. Ed. II, n. 256, Syn. Gram. 46. P. echinatum, Willd. Enum. Hort. Berol. 1032, Trin Sp. (fram Ic. t. 162; Jacq. Eclog. Gram. ii. 28, t. 20. P. hirtellum, Walt. Fl. Uarol. 72. P. hirtil

calycinum, Steud. Nom. Ed II, ii. 257. P. hispidulum, Lamk. Encycl. iv. 744 (non Del.); Retz Obs v. 18; Roxb Fl. Ind. 1. 303 (fid. Ic. Pict.); Wall. Cat. 8688 A.: Wight Cat. n. 2042; Steud. Syn Gram. 47; Franch. & Sav. l. c. 160. P. hispidum, Forst. Prodr. 7; Nees Agrost. Bras. 257. P. horridum, Saltzm. ex Steud. l.c. 47. P. Hosti, Breb. l.c. P. limosum, Presl ex Nees l.c. P. longisetum, Torr. in Am. Journ. Sc. Ser. I iv. (1822) 58. P. mirabile, Braun Del. Sem. Hort. Carlsruhe (1846). P. muricatum, Michr. Fl Bor. Am. 1. 47. P. oryzinum, Gmel. Syst. i. 157; A. Braun in Ind. Sem. Hort Berol. 1851. P. pilosum, Dalz. & Gibs. Bomb. Fl Suppl. 98. P. sabulcolum, Nees Agrost. Bras. 258. P. scabrum, Lamk. Ill. 1. 171; Wight Cat. n. 1648; Steud. l. c. 47. P. stagnınum, Retz. Obs. v. 17; Host Gram Austr. in. t. 51; Koen. in Naturf. l. c.; Roxb. Fl. Ind. i. 295; Nees in Mart. l.c. 26; Griff. Notul. iii. 17; Wall. Cat. n. 8688; Wight Cat. n. 1649. P. Walteri, Pursh Fl. Am. Sept. i. 66. Oplismenus Crus-galli, Dum. Obs Gram. Belg. 138; Kunth Revis. Gram. i. 44, Enum Pl. i. 143; Host l. c. ii. t. 19; Trin. Sp. Gram. Ic. t. 161; Dalz. & Gibs. Bomb. Fl. 292. O. Crus-pavonis, H. B. & K. Nov. Gen. & Sp. i. 108. O P dubius, Kunth Rev. Gram. 1. 44, Enum. i. 143. O. limosus, Presl Rel. Hank. i. 321; Kunth Enum. 1. 144. O. longisetus, Kunth Revis. Gram. l. c. O. muricatus, Kunth l c 44. O. sabulicolus, Kunth Euum. i. 145. O. scaber, Kunth Rev. Gram. i. 44. O. stagninus, Kunth Revis, l. c., Enum. l. c.; Dalz & Gibs. l. c.; Aitchis. Cat. Punjab Pl. 161: Mig. l. c. 464. Echinochloa commutata, Schult. Mant. ii. 267. E. Crus corvi. Beauv. Agrost. 53. E. Crus-galli, Beauv. l.c.; T. Nees Gen. Fl. Germ. Monocol. I t. 21; Reichb. Ic. Fl. Germ. t. 29. E. ? dubia, Roem & Sch. Syst. i. 479. E. hispida, Schult. l. c. E. hispidula, Nees in Royle 1ll. Bot. Himal. 416, 420; Dalz. & Gibs. L.c. Suppl. 98. E. stagnina, Beauv. L.c. Orthopogon Crus-galli & Retzii, Spreng. Syst. i. 307. Ischwmum abbreviatum & tasciculatum, Herb. Ham. ex Wall. Cat. n. 8688. Digitaria hispidula, Willd. Enum. Hort Berol. 91. Milium Crus-galli, Moench. Meth. 202.

Throughout INDIA, especially in wet places and rich soils—Distell, all warm countries.

Annual. Stem 1-3 ft., stout or slender, crect or decumbent below, simple or branched. Leaves flat, up to an inch broad, glabrous or harry; ligule 0. Eaceme 4-8 in., usually inclined, or drooping. Spiles sessile or subsessile, upper gradually shorter, erect erecto-patent or rarely decurved. Spikelets densely packed in 3-5 rows, turgid; gl. I not awned; II and III subequal, usually 5-nerved, awn of III sometimes 14 in. long; IV from orbicular to broadly oblong .- Amongst the innumerable varieties of P. Crus-galli, I find it impossible to find characters constant enough for their limitation. Of exceptional states one with almost glabrous spikes is Echinochloa glabrescens (Munro mss.); it has large spikelets and cuspidate gls. It is Wallich's n. 8687 E. B. C. H., and has been collected in the Western Himalaya, Kha-ia Hills and elsewhere. Another is Ischaemum glabrescens, Ham. ex Wall. Oat. n. 8688 D, with the stem nearly as thick as the little finger, solitary or 2-nate spikes, and spikelets with tubercle-based bristles. Thwaites CP. 900 and 3237, from Ceylon is a third, it has very broad leaves, and the rachis of the spikes is villously hairy. P. murabile, Braun, is a remarkable plant, with 3-fld spikelets, the lower short y awned spikelets pass into P. colonum, through var. frumentaceum, and it is not unlikely that some of the synonyms placed under P. Crus-galli should be transferred to P. colonum, and vice versa.

Var. frumentaceum; tall, robust, spikes thickened incurved sometimes corymbose with densely crowded unawned spikelets, otherwise as P. Crus-galli. P. frumentaceum, Roxb. Fl. Ind. i. 304; Schult. Mant. ii. 230, Trin. Sp. Gram. Ic. t. 164; Diss. ii. 132; Wall. Cat. n. 8686; Wight Cat. n. 1617; Duthie Grass. N.W. Ind. 4,

Field & Gard. Crops 3, t. 24, Fodd. Grass. N. Ind. 8; Franch. & Sav. En. Pl Jap. in. 161. P. Crus-galli, Wall. Cat. n. 8687, C. G. P. Crus-galli, var. frumentaceum Trim. Cat. Ceyl. Pl. 104. P. grossum, Salisb. Prodr. 18. P. segetile, Herb. Roxb. Oplismenus frumentaceus, Kunth Revis. Gram. i. 45, Enum. Pl. 1. 146; Dale. & Gibs. Bomb. Fl. Suppl. 98. Echinochloa frumentacea, Link Enum. Hort. Berol. i. 204; Attchis. Cat. Panyab Pl. 161; Mig. Fl. Ind. Bat. ni. 465.—Cultivated in the hotter parts of Asia and Africa.—Roxburgh (Fl. Ind. l. c.) says of P. hispidulum, which is undoubtedly referable to P. Crus-galli, "It comes very near my P frumentaceum, and may probably be the same in its wild state."

6. P. colonum, Linn. Syst Ed. x. 870; stem rather slender decumbent or shortly creeping below, leaves narrow scaberulous, raceme contracted. spikes subcrect  $1-l\frac{1}{2}$  in. usually distant, rachis pilose, sp kelets  $\frac{1}{10}-\frac{1}{8}$  in. acute or subcuspidate glabrous or hispidulous, gl.  $1=\frac{1}{2}$  III or shorter acute 3-5-nerved, II and III subequal acute, III paleate, IV ovoid or oblong obtuse or acute and palea coriaceous white. Jacq Eclog. Gram. t. 32; Ehret. Ic. Sel. t. 3, f. 3, Beauv. Agrost. t. x. f. 6, Trin Sp. Gram. Ic. t. 160; Steud. Syn Gram. 46; Wall. Cat. n 8685; Trim. Cat. Ceyl. Pl. 104; Duthie Grass N. W. Ind. 3, Indig. Fodd. Grass. t. 4, Fodd. Grass. N. Ind. 4; Benth Fl. Hongk. 411, Fl. Austral. vii. 478; Boiss. Fl. Orient. v. 435; Franch. & Sav. En. Pl. Jap. ii. 160; Griseb. Fl. Brit W. Ind. 545. arabicum, Nees ex Steud Nom. Ed. II, ii. 251, Syn. Gram. 63. P. brizoides, Linn. Mant. i. 184. P. cæsıum, Nees in Hook. & Arn. Bot. Becch. Voy. 235; Steud. l.c. 47. P. confertum, Herb. Rottl. ex Wall. Cat. n. 8687 B. P. Crus-galli, Wall. Cat. n. 8687 I; var. colonum, Coss. Expl. Alger. 28; var. minor, Thw. Enum Pl. Zeyl. 359. P. cuspidatum, Roxb. Fl. Ind. i. 298; Duthie Grass. N.W. Ind. 3; Steud. l.c.; Fig. & de Not. in. Mem. Acad. Tor. (1854) 340, t. xiii. f. 1-16. P. Daltoni, Parlat. ex Webb in Hook. Niger Fl. 185; Steud. l. c. P. flaccidum, Wall. Cat. n. 8692 H (in part). P. grossarium, Griff. Notul in. 36, Ic. Pl. Asiat. t. 139, f. 113. P. hæmatodes, Presl Fl. Sic. 1. 43; Steud. l. c. P. numidianum Presl Cyp. & Gram. Sic. 19. P. Petiven, Kotsch. ex Griseb. Fl. Brit. W. Ind. 545. P. pictum, Kan. in Naturf xxiii. (1788) 204; Wight Cat. n. 1648; Nees in Mart. Fl. Bras. ii. 120? P. Pseudo-colonum, Roth Nov. Sp. 147; Steud. l. c. 46. P. semiverticillatum, Herb. Rottl. (non Rottl. in Ainsl. Mat. Med.). P. tetrastichum, Forsk. Fl. Æg. Arab. 19. P. zonale, Presl Prodr. Fl. Sic. 1. 82. Oplismenus colonus, H. B & K. Nov. Gen. & Sp. i. 108; Kunth Enum. Pl. 1. 142; Dalz. & Gibs. Bomb. Fl. 291; Aitchis. Cat. Punjab Pl. 161. O. ? cuspidatus, Kunth Revis. Gram. i. 45, Enum. i. 147. O. Pseudo-colonus, Kunth l. l. c. 44, 142. Digitaria? cuspidata, Schult. Mant. ii. 265 .- Panicum, Wall. Cat. n. 8694, 8726 .- Sloane Hist. Jam. i. t. 64, f. 3.

Throughout INDIA and Ceylon, ascending the Himalaya to 6000 ft.—DISTRIB. all warm countries.

In its typical form P. colonum differs from Crus-galli by the characters given above, but there is a gradual transition of one into the other; and the cultivated var. frumentaceum has been assigned to both, having the unawned spikelets of the former, and the broad leaves robust habit and long crowded spikes with crowded spikelets of the latter. I find it very difficult in many cases to decide whether to refer certain specimens to the one or to the other, and am not at all confident that the synonymy of the two is in all cases right. Both Cosson and Thwaites regard colonum as a form of Crus-galli.

7. P. notabile, Hook. f.; spikes much longer than the internodes, rachis scabrid, spikelets in 2-3-seriate silkily hairy, gl. II subaristately

acuminate, III paleate male, IV orbicular-oblong rugulose shortly awned. -Panicum, Wall. Cat. n. 8723.

BURMA; Petroleum wells of the Irawaddi, Wallich.

Stem 18-24 in., robust and toliage of Crus-galli, nodes pubescent. Leaves 3-5 in., finely acuminate, culate towards the base; sheaths sparsely hairy; ligule 0. Pamele 5 in., rachis flattened and angular, much narrower than the spikelets. Spikelets erect, imbricate, pale, sparsely silkily pubescent; gls. membranous, I=1 III, broadly ovate, obtuse, 3-nerved; II ovate, finely beaked, 5-nerved, hirsute; III very broadly obovate, cuspidately acuminate, the inflexed margins densely ciliate with long erect hairs; awn of IV as long as itself, strict, scabiid.—A very remarkable grass, with the habit of P. Crus-galli, but with the rugulose awned gl. IV of P. jaranicum, and hence intermediate between the sections Echinochloa and Brachiania.

## Sect. III. Brachiaria. (See p. 27.)

See P. turgidum in Sect. Errusæ.

- \* Gl. I nearly as long as III; IV shortly awned.
- 8. P. ambiguum, Trin. Gen. Panic. 155; leaves narrow hairy base rounded, spikes lew suberect, spikelets \( \frac{1}{2} - \frac{1}{6} \) in , glabrous, gl. I ovate acute 5-nerved, II ovate-lanceolate acuminate 7-nerved, III epaleate, IV oblong minutely rugulose. Steud. Syn. Gram. 61. P. infidum, Trim. Cat. Ceyl. Pl. 104 (non Trin.). P. javanicum, Thw. Enum. Pl. Zeyl 358. P. sanguinale, Burm. Fl. Ind. t. 10, f. 2 (non descr). Urochloa paspaloides, Presl Rel. Hænk. i. 318 (fid. Trin.); Kunth Enum. Pl. 1. 75.

Burma; Mergni, Griffith. Ceylon, Gardner, Thwaites (CP. n. 858, 3244) .--

DISTRIB. Mascarene, Malay and Pacific Islds.

Annual. Stems 1-2 ft., slender, much branched from the base; nodes glabrous or puberulous. Leaves 3-6 by 1-1 in., acuminate; sheaths glabrous or inargins ciliate; ligule a tuft of hairs. Spikes 3-4, 1-2 in.; rachis slender, triquetious, glabrous or with a few hairs at the nodes. Spikelets 2-seriate, alternate, sub-erect; palea of IV with green nerves; awn of IV concealed by II and III.—The subequal gls. I and III will distinguish this from all other species of the Brachiaria section. P. ambiguum, Fig. & de Notar. is a very different plant. Presi describes two varieties in the Philippines; a lower gl. hardly half as long as the others; β glumes subæquilong. I have seen no Indian or other specimens answering to α.

- \*\* Gl. I much shorter than III; IV often abruptly apiculate.
- § Spikelets  $\frac{1}{20-16}$  in.
- 9. P. prostratum, Lamk. Illustr. i. 171, Encycl. iv. 745; leaves short, base broad amplexicaul and sheaths ciliate, spikes usually crowded suberect, rachis trigonous, pedicels with long cilia, spikelets 20-18 in. crowded subsessile 2-3-seriate ellipsoid glabrous, gl. I very short semilunar, II ovate acute 5-7-nerved, III 5-nerved paleate, IV obovate apiculate minutely rugulose. Trin. Diss. ii. 150, Panic. Gen. 158, Sp. Gram. Ic. t. 184, 185; Kunth Enum. Pl. i. 89, Suppl. 68; Steud. Syn. Gram. 62; Thw. Enum. Pl. Zeyl. 359; Trim. Cat. Ceyl. Pl. 105; Aitchis. Cat. Panjab. Pl. 160; Duthie Grass. N.W. Ind. 6, Indig. Fold. Grass. t. 45, Fold. Grass. N. Ind. 11; Benth. Fl. Austral. vii. 476; Griseb Fl. Brit. W. Ind. 540. P. barbatum, Lamk. Illustr. l.c. P. cospitosum, Sw. Fl. Ind. Occ. i. 146. P. crispum, Llanos Fragment. 42. P. hirsutum, Heyne ex Wall. Cat. n. 8734 B. P. marginatum, Valil ex Herb. Ruttl. et ex Wall. Cat. n. 8732

B. P. procumbens, Nees Agrost. Bras. 109; Herb. Wight, n. 3052. P repens, Burm. var. alt. Fl. Ind. t. 11, f 1; Rottl. in Neue Schrift iv. (1803) 182. P. setigerum, Herb. Roxb. ex Wall. Cat. n. 8733 A. D. P. Sieberi, Link. Hort. Berol. i 207. P. vialicum, Saltzm. ex Doell. in Mart. Fl. Bras in. II 155.—Panicum, Wall. Cat. n. 8733 A.—D. 8734 B. C. D. Giamen paniceum minus, &c. Petiv. ex Scheuchz. Agrost. 51 (non P. Petiverii, Trin.).

PLAINS OF INDIA, from the Panjab to Assam and Burma, and southward to

CEYLON.—DISTRIB. Tropics generally.

Annual or perennial, usually small; stem 4-18 in., creeping below; nodes glabrous. Leaves 1-2 in., up to \(\frac{3}{2}\) in. broad, ovate-lanceolate, acumunate; sheaths ciliate; ligule 0. Panicle usually shortly peduncled. Spikes subsecund, at length spreading; rachus scabrid and hairy. Spikelets pale, rather turgid; pedicels with cilia longer than the spikelets, gl I nerveless or 3-nerved; palea of III oblong, acute—A common Bengal plant, of which and P. villosum I find it impossible to unravel the synonymy with confidence. Nees (Agrost. Bras. 109) includes under procumbens, repens, Burm. & Roxb. (not Lenn.), prostratum, \(\beta\) Lamk., setigerum, Retz & Roxb., umbrosum, Retz & Roxb., grossarum, Koen. (not Lenn.), larbatum, Lamk, & subcordatum, Roth. Wight (Cat.) includes under procumbens, Nees, besides most of the above, P. hartum, Roth (Rothii, Spreng.) which is Oplismenus compositus. Mr Rendle informs me that Petiver's plant, which Trinius cites as the type of his P. Petwerre, is P. prostratum, Lamk, but that the P. Petiverio of Trinius' Icones is P. grossarium, Koen., not Lenn.), which I refer to the P. ramosari.

Var. rigidium; stem very stout wholly prostrate much branched, leaves ½ intriangular-ovaterigid pungent ciliate with long hairs.—Wall. Cat. n. 8723 (in part). Calcutta, Clarke? Burna, Wallich. (The specimen has evidently been misplaced

in the sheet of P. notabile.)

Var. burmanicum; leaves sparsely hairy beneath, gl. II and III puberulous.—Burma, Collett.

10. **P. villosum**, Lamk. Illustr. i. 173, Encycl. iv. 745; leaves ovate-oblong obtuse or acute densely pubescent on both surfaces base rounded, spikes secund erect tomentose, spikelets ½ - ½ in. ellipsoid glabrous or tomentose, gl. I very short semi-lunar nerveless, II ovate acute 7-nerved, III ovate-oblong acute paleate, IV obovate abruptly apiculate minutely rugulose. Kunth Enum. Pl. i. 98; Herb. Wight n. 3053. P. Careyanum, Nees Agrost. Bras. 118. P. coccospermum, Steud. Syn. Gram. 62; Thue. Enum. Pl. Zeyl. 359; Trim. Cat. Ceyl. Pl. 105. P. grossarium, Roxb. Fl. Ind i. 297; Hochst. in Herb. Hohen. n. 919. P. nanum, Nees in Herb. Royle, ex Steud. l.c.; Duthie Grass. N.W. Ind. 5. P. nilagiricum, Steud. l c. P. procumbens, β (setigerum, Roxb.) Wight Cat. n. 3053. P. repens, Roxb. Fl. Ind. i. 299. P. vestitum, Nees in Herb. Royle ex Steud. l.c.; Aitchis. Cat. Panyab. Pl. 160; Duthie Grass. N.W. Ind. 7, Fodd. Grass. N. Ind. 13.—Panicum, Wall. Cat. n. 8733 E. 8735.

Subtropical and tropical HIMALAYA, from the Chenab to Sikkim, alt. 3-6000 ft. Khasia Hills, alt. 2-6000 ft. Nilehiri Hills. Burma, Wallich. Crylon, Gardner.—Distrib. Tonkin, China.

Annual. Habit of *P. prostratum*, with which it has been confounded, but is a hill plant, distinguished by its hairy leaves and much more hairy spike and spikelets.

<sup>++</sup> Spikelets 70-1 in.

<sup>§</sup> Spikelets usually close together, more or less imbricating.

<sup>10\*.</sup> P. muticum, Forsk. Fl. Aeg. Arab. 20; stout, nodes bearded,

leaves long, base subcordate, panicle deltoid glabrous, spikes alternate, rachis narrow flattened, spikelets \(^1\) in. crowded ovoid acute glabrous, gl. \( I = \frac{1}{7} \) of III ovate acute 1-nerved, II and III subequal 5-nerved, III paleate male, IV ellipsoid obtuse margins narrowly incurved. Schult. Mant. ii. 225; Kunth Enum. Pl i. 93, Steud. Syn. Gram. 40. P. amphibum, Steud. l. c. 61; Zoll. Pl. Rar. Jav. 416 P. barbinode, Trin. Gram. Panic. 168, Sp. Gram. Ic. t. 318; Thuv. Enum. Pl. Zeyl. 361; Steud. l. c. 67; Duthie Grass. N.W. Ind. 2. P. equinum, Salizm. ex Steud. l. c. P. leiogonum, Sieb. Pl. Egypt exicc.; Link. Hort. Berol. i. 206; Steud. l. c. 79. P. Meyerianum, Nees Fl. Afr. Austr. i. 32; Steud. l. c. 61. P. molle, Griseb. Fl. Brit. W. Ind. 547 (excl. Syn.) non Sw.; Baker Fl. Maurit. 436; Trim. Cat. Ceyl. Pl. 105 (non Sw.). P. numidianum, Lamk. Ill. i. 122, Dict iv. 749; Desf. Fl. Atlant i. 60, t. 11; Trin. Sp. Gram. Ic. t. 174; Steud. l. c. 345; Doctl. in Mart. Fl. Bras. ii. II. 187. P. pictiglume, Steud. l. c. 73. P. paraguayense, Steud. in Pl. Rengz (name only). P. punctulatum, Arn ex Wight Cat. n. 2039; Steud. l. c. 62. P. purpurascens, Raddi ex Opiz. in Flora, v. (1822) 266; Nees Agrost. Bras. 240; Steud. l. c. 57. P. sarmentosum, Hassk Pl. Jav. Rar 17 (non Roxb.). Paspalum mollicomum, Kunth l. c. 47; Steud. l. c. 31. Digitaria mauritiana, Wall. mss (lc. in Herb. Kew).—Panicum, Wall. Cut. n. 8724.

BENGAL and CEYLON, in marshes, cultivated or naturalized. - DISTRIB. Java, Africa, America.

Stem ascending, 6-8 ft. high; nodes softly bearded, rarely glabrescent. Leaves 6-10 by  $\frac{1}{3}$ - $\frac{1}{3}$  in., and sheaths glabrous or harry; ligule short, ciliate. Panicle creet, 3-5 in.; rachis stiff, scabrid. Spiles rather distant, stout, simple or divided below, lower 2-4 in., upper gradually shorter, rachis  $\frac{1}{10}$  in. broad subhispid. Spiles turgid, sometimes solitary and alternate throughout the spike, green or purplish; gl. IV obscurely dotted or roughened.—The Water-grass of the Mauritius and Ceylon. I find gl. III to be always male, but being described as neuter by others it no doubt varies in this respect, as do so many other P-anica. It is very near the American P-molle, Sw., and is often confounded with it, and the English names given above apply to both. It is distinguished from P-molle by the glabrous panicle and 1-nerved (not 3-nerved) gl. I.

11. P. javanicum, Poir. Encycl. Suppl. iv. t. 274; pubescent or hairy, leaf-base rounded or cordate, spikes 6-12, spikelets \(\frac{1}{2}\)-\(\frac{1}{2}\) iu., biseriate alternate or upper scattered ovate acute, gl. I not = \(\frac{1}{2}\) II 3-nerved, II 7-nerved acute, III like II 5-nerved paleate. IV oblong rugulose shortly abruptly awned. Trin. Pan. Gen. 155; Buker Fl. Maurit. 434. P. Helopus, Trin. in Spreng. N. Entleck. ii. 84, Pan. Gen. 150, Sp. Gram. Ic. t. 183; Nees Agrost. Bras. 117; Stend. Syn. Gram. 7; Duthie Grass. N.W. Ind. 4, Indig. Fodd. Grass. t. 7, Fodd. Grass. N. Ind. 8 (excl. some Syns.); Benth. Fl. Austral. vii. 476 (in note). P. japonicum, error for javanicum, Kunth Revis. Gram. i. 205, in syn. P. hirsutum, Koen. ex Roxb. Fl. Ind. i. 300, & Wight Cut. n. 1620; Artchis. Cat. Panjab. Pl. 159. P. Koenigii, Spreng. Syst. i. 311. P. papillosum, Fenzl ex Steud. l. c. 100. P. paspaloides, Herb. Heyne, ex Wall. Cat. n. 8729. P repens, Herb. Roxb. ex Wall. l. c. n. 8731 A (non Fl. Ind.). P. trichopus, Hochst. in Flora, xxvii. (1844) 254. Oplismenus? hirsutus, Schult. Mant. ii. 271. O. javanicus, Roem. & Sch. Syst. ii. 891. Helopus trichopus, Hochst. ex Steud. l. c. 100. Setaria? hirsuta, Kunth Revis. Gram. i. 47, Enum. Pl. i. 157. S. pilifera, Spreng. Syst. iv. Cur. Post. 33. Urochloa panicoides. Beauv. Agrost. 52, t. 11, f. 1; Kunth l. c. i. 205, t. 14, Enum. 74 (excl. Syn. Roxb.); Schult.

Mant. iii. 595. U. pubescens, Kunth l. l. c. 31, 74. U. mauritiana, Bojer Hort. Maurit. 363.—Panicum, Sp. Wall. Cat. n. 8729.

Plains of INDIA, from Kashmir to Bengal, and southward to CEYLON. - DISTRIB.

Tropics generally.

- Annual. Stem 1-2 ft., decumbent and rooting below, nodes pubescent. Leaves 1-5 by \$\frac{1}{3}-\frac{7}{3}\$ in, flat or undulate, very variable in breadth and form of base, lanceolate, acuminate and loose sheath laxly hairy; ligule a beard. Spikes \$\frac{3}{3}-2\$ in. long, secund, spreading; rachis 3-gonous, pubescent and with a few long hairs. Spikelets \$\frac{1}{3}\$ in., geminate or upper solitary, usually pubescent, pale; pedicels very short; gl. I acute or obtuse; III male, palea oblong; IV rounded at the tip.—Kunth (Revis. Gram. i. 206) says, under Urochloa panicoides, that he has examined in Desfontaine's Herbarium the type of Poiret's P. javanicum, and identified it, which he cites as a syn. of Urochloa panicoides, but his figure of which again quite accords with a narrow-leaved form of P. Helopus, Trin. This requires the adoption the name javanicum (by misprint japonicum in Kunth Revis.), for the species. Bentham, on the other hand (Fl. Austral. vii. 477), says that Munro has seen an authentic specimen of javanicum, and that it is quite distinct from P. Helopus. I have no means of verifying either authority.
- 12. P. ramosum, Linn. Mant. i. 29; suberect, glabrous or pubescent, leaves amplexicaul, spikes many often crowded suberect, rachis scabrid and harry, spikelets \( \frac{1}{10} \) \] \] in. 1-2-seriate elliptic ovoid or obovoid glabrous or pubescent, gl. I = \( \frac{1}{2} \) III ovate 3-5-nerved margins overlapping, II 7-nerved, III: 5-7-nerved neuter, palea narrow, IV subobovoid apiculate transversely rugulose. Kunth Enum. Pl. i. 125; Steud. Syn. Gram. 97; Wall. Cat. n. 8727 A. P. arvense, Kunth Revis. Gram. n. 391, t. 109; Enum. Pl. i. 93; Steud. l.c. 67. P. aquariorum, Bansium & quinquani gulare, Ham. ex Wall. Cat. n. 8727 C, 8725 A. B. P. canescens, Wight Cat. n. 1622 (non Roth.). P. fluitans, Herb. Heyne ex Wall. Cat. n. 8727 B. P. grossarium, Koen. in Naturf. xxiii. (1788) 205 (& Heyne & Roxb. in Herb. Banks). P. Kotschyanum, Hochst. in Flora xxv. (1842) Bebl. i. 33; Steud. l. c. 68. P. nudiglume, Hochst. l.c. xxvii. (1844) 33; Steud. l. c. 68. P. nudiglume, Hochst. l.c. xxvii. (1844) 33; Steud. l. c. P. Petiverii, Trin. Diss. ii. 144, Pan. Gen. 171, Sp. Gram. Ic. t. 176 A. B.; Kunth Enum. Pl. i. 91; Nees Agrost. Bras. 111; Steud. l.c.; Wight Cat. n. 1622, Herb. n. 1628, in part, & n. 3226; Aitchis. Cat. Panjab Pl. 160; Duthre Grass. N.W Ind. 6, Fodd. Grass. N. Ind. 11; Boiss. Fl. Orient. v. 439. P. psilopodium, Koen ex Trin. Pan Gen. 217. P. semiverticillatum, Wight Cat. n. 1125. P. umbrosum, Retz. Obs. iv. 16; Roxb. Fl. Ind. i. 297, Ic. pict. 103, 797.—Panicum, Wall. Cat. n. 8725 A. B. 8727 A. B. C. and D in part.

Plains of India, from Scind and the N.W. Provinces to Behar and southward to

Madras.—DISTRIB. Affghan.

- Annual? Stem 1-3 ft., decumbent and branched below; branches erect, leafy. Leaves 3-4 by \(\frac{1}{4}\)-1 in, lanceolate, acuminate, thin, glabrous or pubescent, base rounded and usually deeply lobed, margins minutely ciliolate; sheath glabrous or pubescent, mouth usually ciliate; ligule short. Panicle 2-6 in., inclined, oblong, glabrous or pubescent; rachis angular. Spikes 1-2 in., erecto-patent, rather distant, sometimes divided at the base. Spikelets alternate, close or distant, often in pairs a sessile and pedicelled, pule green or yellowish, turgid; pedicel usually with long cilia.—I think this is certainly P. umbrosum, Retz & Roxb.
- 13. P. setigerum, Retz. Obs. iv. 15; leaves ovate-lanceolate with long cilia towards the amplexical base margins below crenulately wrinkled, spikes alternate, pedicels with scattered long hairs, spikelets in biseriate alternate imbricate subsessile ovate acuminate glabrous or pubescent, gl. I

=\frac{2}{3} III obtuse 3-nerved, II ovate-lanceolate acuminate 7-nerved, III 5-nerved neuter, palea as broad acuminate, IV broadly oblong mucronate or shortly awned finely rugulose. Roxb. Fl Ind. i. 299, Kunth Enum. Pl. 90 (excl. some Syns.); Herb Ham. ex Wall. Cat. n. 8730 B. P. affine, Poir. Encycl. Suppl. 1v. 273 (ex Kunth). P. grossarium, Roxb Ic. Ined. t. 798 (not Fl. Ind.). P. Helopus, Trin. (hirsutum, Koen), Wight Cat. n. 1620. P. lanceolatum, Herb. Heine ex Wall. Cat. n. 8730 A. P. nutans, Herb. Rottl. P. prostratum, forma major, Thw. Enum. Pl. Zeyl. 359. P. prostratum, var. horizontale, Trin. Cat. Ceyl. Pl. 105. P. repens, Herb. Wight ex Wall. Cat. n. 8730 C. P. subcordatum, Herb. Wight ex Wall. Uat. 8730 D. ? Oplismenus prostratus, Edgew. in Journ. Linn. Soc. vi. (1862) 195.—Panicum, Wall. Uat. n. 8727 D, in part, 8730.

BENGAL; common. The CONCAN and SOUTH DECCAN, Rottler, &c. CEYLON, Thwastes (C.P. 3236).

Stem 2-3 ft., slender, prostrate and widely straggling below; lower internodes long; nodes rooting, tomentose Leaves 3-5 by \( \frac{1}{2} - 1 \)\cdot\) in., finely acuminate, flat, margins crispedly wrinkled below, or to beyond the middle; sheath with ciliate margins; ligule a few hairs. Spiles 3-6, suberect or spreading, rather distant; angles of rachis scaberulous. Spiles is solitary or geminate, suberect, very acuminate.—It is impossible to recognize this species from Retz's description, but the name attached to three different specimens in Rottler's Herbarium leaves little doubt as to his plant. Rooburgh describes setigerum as having the stem almost woody towards the base, which is hardly the case in the specimens I have seen. Edgeworth cites P. setigerum, Roxb., for his Oplismenus prostratus, but it may well be doubted if he knew Roxburgh's plant.

Var. tomentosum, leaves 6-7 in., margins and sheaths with very long hairs, spike-

lets larger 1 in. long tomentose, awn longer.

14. P. distachyum, Linn. Mant. i. 138; slender, quite glabrous, or panicle sparsely hairy, leaves linear or lanceolate base rounded, spikes 2-4 distant spreading, spikelets \( \frac{1}{2} \) \( \frac{1}{2} \) in. solitary subsessile 1-2-seriate ellipsoid glabrous, gl. I = \( \frac{1}{2} \) II 5-7-nerved, II ovate acute 7-nerved, III 5-nerved, IV ellipsoid obscurely rugulose top rounded. Retz. Obs. iii. 17; Lamk. Ill. t. 43, f. 2; Kunth Enum. Pl. 91; Steud. Sun. Gram. 41; Wight Cat. n. 1612; Thw. Enum. Pl. Zoyl. 359; Trim. Cat. Coyl. Pl. 104, Aitchis. Cat. Panjab. Pl. 159; Duthie Grass. N.W. Ind. 3. Indig. Fodd. Grass. t. 42, Fodd. Grass. N. Ind. 6; Benth. Fl. Austral. vii. 478. P. distachyon & marginatum, Herb. Madr ex Wull. Cat. n. 8732 A. B. P. dimidiatum, Heyne ex Wull. Cat. n. 8732 D. P. subquadriparum, Trin. Gram. Panic. 145, Sp. Gram. Ic. t. 186; Kunth l. c. 80; Steud. l. c. 60. P. repens, Herb. Roab. ex Wall. l. c. 8731 A. Digitaria distachya, Pers. Syn. i. 85.—Panicum, Wall. Cat. n. 8732, 8732.

Plains of India, from the Panjab to Upper Assam and Burma, and southward to Malacca and Ceylon. Great Cocos Isld (Ind. Occau), Prain.—DISTRIB.

China, Malaya, Australia.

Stems 1-2 ft., branched, straggling and creeping below. Leaves 2-6 by \$-\frac{1}{2}\$ in., flat, margins of sheath ciliate or not, mouth hairy. Spikes 1-2\frac{1}{2}\$ in., rarely more than 4, erect, at length spreading; raches slender, glabrous. Spikelets variable in size, pale green; gl. I with overlapping margins below; II paleate or not, palea if present narrow, neuter.

Var. brevifolium, Wight & Arn. in Wight Cat. n. 1612 a; leaves 3-1 in., ovate-

lanceolate, spikes shorter, rachis broader, spikelets 2-seriate.—Drier places.

§§ Spikelets more or less remote.

15. P. semiverticillatum, Rottler in Ainslie, Mat. Med. Hindost. Ed I 219 (name only); stem stout erect branched, leaves broad base woolly, panicle large pubescent, spakes distant long alternate or whorled lax-fid, rachis slender, spikelets \(\frac{1}{2}\) in ovoid obtuse glabrous, gl I much shorter than III very broad obtuse 5-nerved, III obtuse 7-nerved, III 5-nerved, palea narrow hyaline, IV ovate-oblong obtuse minutely granulate. Steud. Syn. Gram. 62. P. semiverticillatum, Wight Cat. n. 3050 \(^p\), 3051. P. Petiverii, Thus. Enum. Pl Zeyl. 359.

SOUTH DECCAN, Coimbatore, Rattler, Wight; Anamallay Hills, Beddome

CEYLON, at Damboul, Gardner (C.P. 895).

Stem tall, erect, or base shortly decumbent; nodes and often internodes below them tomentose. Leaves 5-8 by  $\frac{1}{3}-\frac{1}{2}$  in, linear-lanceolate, finely acuminate, flat, glabrous except at the narrow base, sheath tomentose above; ligule a turt of wool. Pancele 4-8 in, subpyramidal;  $Spikes 1-2\frac{1}{2}$  in,; rachis triquetrous, glabrous or pubescent. Spikelets pale, often solitary, upper shortly pedicelled.—Possibly a cult. form of P. \*\*amosum\*. Described by Ann-lie as a grain cultivated by the poor at Coimbatore and in other grain countries. I assume it to be Rottler's plant, relying on Wight, who had resided at Coimbatore. P. semiverticillatum, Herb. Rottler, from Jaffua in Ceylon is P colorum.

16. **P. remotum**, Retz. Obs. iv. 17; very slender, leaves long narrow a pd sheaths quite glabrous, spikes few distant slender spreading, spikelets  $\frac{1}{70}$  in. distant subsolitary ellipsoid obtuse glabrous, gl.  $I = \frac{1}{3} - \frac{1}{2}$  III obtuse or subacute 3-nerved, II obtuse 5-7-nerved. III 5-nerved, palea narrow, IV elliptic obtuse minutely rugulose. Kunth Enum. Pl. i. 125; Steud. Syn. Gram. 68. P. grossarium, Koen. var. Herb. Rottler. P. Petiveri, Tri. Sp. Gram. Ic. t. 176, f. C. P. relaxatum, Nees ex Steud. Nom Ed. 11. ii. 262; Wight Cat. n. 1623 a, and  $\beta$  depauperatum.

Orissa, Herb. Calcutt. South Deccan, Rottler; Courtallam, Wight; Ana-

mallay Hills, Beddome.

Stem 1-2 ft., much branched, decumbent, flaccid. Leaves 2-4 by \(\frac{1}{2}\) in., finely acuminate, membranous, base quite glabrous; ligule very short, lacerate. Spikes 6-8, 2-4 in. long; rachs very slender, almost capillary, triquetrous, quite glabrous. Spikelets solitary or in distant pairs, sessile, or the upper long-pedicelled; glumes thin, pale with green nerves.—I find no difference between New two vars. of relaxatum.

17. **P. Kurzii**, *Hook f.*; slender, leaves short lanceolate base cordate, margins of sheaths culate, spikes few very slender naked or with few hairs, spikelets  $\frac{1}{10}$  in. ovoid acute glabrous, gl. I =  $\frac{1}{3}$ - $\frac{1}{3}$  III 3-5-nerved, II ovate acuminate 7-nerved, III 5-nerved, palea broad, IV elliptic-oblong minutely rigulose, tip rounded apiculate.—Panicum, *Wall. Cat.* n 8745.

LOWER BENGAL, Wallich, Griffith; Seebpore, Kurz; Vicrampore and Dacca,

Marke. BRHAR; top of Parusnath, J. D. H.

Annual, decumbent and rooting below, flaccid. Leaves 2-3 by 1-3 in., acuminate, margins crisped towards the usually chlate base; sheath with villous margins; ligule bearded. Panicle 2-6 in. long; spikes few, very distant, 2-3 in. long, with rarely a short branch bearing 2-3 spikelets towards the base of the lower. Spikelets pale, subsessile or pedicelled.—This Lower Bengal plant found at Seebpore close to the Calcutta Bot. Garden, should be one of Roxburgh's species, but I cannot identify it. It is vory closely allied to P. remotum and altogether like that plant in labit, differing chiefly in the short leaves and the chiate margins of the leaf-sheaths and in labitate. A doubtful specimen from Baidyanath (Santal Pergunnahs) collected by Clarke, has the narrow leaves of remotum.

18. **P. latifolium**, Linn. Sp. Pl. 58; stem prostrate and rooting below, leaves lanceolate acuminate base rounded or cordate, panicle lax, branches distant stout, rachis scaberulous, spikelets large \(\frac{1}{2}\)-\(\frac{1}{2}\) in. very distant secund solitary or in pairs, glumes conaceous 5-nerved, tips thickened, I=\(\frac{1}{3}\) II or longer, II and III subequal, III broadest triandrous, palea narrow, IV ovoid acuminate quite smooth. Willd. Sp. Pl. i. 350; Kunth Enum. Pl. i. 117; H. B. & K. Nov. Gen. & Sp. i. 100. P. Balbisianum, Schult Mant. ii. 254; Steud. Syn. Gram. 76. P. grandiflorum, Trin. ex Nees Agrost. Bras. 154. P. oryzoides, Sw. Prodr. 23, Fl. Ind. Occ. i. 161, Kunth l. o. 129; Nees Agrost. Bras. 154, Steud. l. c. 80; Arduin. Animadv. ii. t. 5; Griseb. Fl. Brit W. Ind. 547. P. Pseudo-oryzoides, Steud. l. c. 75. P. Ridleyi, Hack in Trans Linn. Svc. Ser. II. Bot. ii. 401. (name). P. zizanioides, H. B. K. l. c.; Steud. l. c. 75—Punicum, Griff. Notul. iii. 31, n. 17.—Wall. Cat. n. 8706.—Gram. Virgin. &c. Moris. Hist. Pl. iii. 196, t. 8, f. 4.—Sloane Hist. Jam. i. 114, t. 71, f. 3.

BENGAL, SILHET, CACHAR, BUEMA, and the MALAY PENINS.—DISTRIB. Eastern trop. Asia and America.

Stem 6-24 in , rather stout, extensively creeping, glabrous, or nodes tomentose. Leaves 1-6 by \(\frac{1}{2}\) in , subdistictions, flat, glabrous; sheaths smooth; ligule short, chate. Pancle 1-6 in., erect, contracted; branches simple or sparingly divided, having short 3-fid. branchlets at the base; raches stiff, angular. Spakelets turged, very obscurely jointed on the short stiff pedicels, pale green; gls. all broadly ovate, their thickened tips laterally compressed, lateral nerves on each side close together; III empty or imperfectly triandrous.—The compressed thickened tips of the glumes are very characteristic.

Var. majus; stem stout 4-6 ft., internodes 4-6 in. rigid, nodes tomentose, leaves in. broad, inarguns thickened, base narrowed, panule nearly 12 in. long.—Malay

Peninsula, at Goping, King's Collector.

# Sect. IV. HYMENACHNE. (See p. 27.)

19. P. myurus, H. B. & K. Nov. Gen. & Sp. i. 98 (excl. Syn. Lamk.); stem tall stout spongy below, leaves long flat base cordate, panicle narrow very compound often interrupted, branches closely appressed, spikelets \$\frac{1}{2}\frac{1}{4}\text{ in.}\$ erect narrowly lanceolate, gl. I = \$\frac{1}{2}\text{ III, II } 3-nerved, III much longer than II 3-5-nerved, IV small thin lanceolate. Kunth Revis. Gram. i. 33, Enum. Pl. i. 86, Suppl. 65; Thw Enum. Pl. Zeyl 361; Trum. Cat. Ceyl. Pl. 104; Duthie Fold. Grass. N. Ind. 10 (excl. Syn.), Benth. Fl. Austral. vii. 480 (excl. Syn. interruptum)—Excl. in all Syn. Lumk. Rudge, Richard, Trin. P. acutiglumum, Steud. Syn. Gram. 66. P. auritum, Hassk. Pl. Rar. Jav. 22 (non Presl.). P. cynosuroides, Herb. Rottl. P. Hasskarlii, Steud. in Zoll. Syst. Verz. 54, Syn Gram. 70; Miq. Fl. Ind. Bot. iii. 456. P. myurum, Meyer Fl. Esseq. 50 (excl. Syn. Lumk. & Rudge). P. mangaloricum, Steud. l. c. 78. P. serratulum, Herb. Ham. in Wall. Cat. n. 8699. P. serrulatum, Roxb. Fl. Ind. 1. 307; Kunth Enum. Pl. i. 126. Hymenachne myuros, Beauv. Agrost. 49, t. 10, 'f. 8 (excl. Syn. Lum.); Nees Agrost. Bras. 275; Griseb. Fl. Brit. W. Ind. 553 (excl. Syn.); Steud. l.c. Agrostis alopecuroides, Valil. mss., & A monostachys, Poir. Encycl. Suppl. 1. 250, ex Kunth l. c.—Panicum, Wall. Oat. n. 8699.

Marshes in Upper and Lower BENGAL, ASSAM, SILITET, the DECCAN, MALAYAN PENINSULA and CRYLON.—DISTEIB. Trop. As. Austral. and Amer.

Stem erect, 2-6 ft., leafy, rooting at the nodes of the prostrate base, which is often as thick as a swan's quill. Leaves 12-18 by  $\frac{n}{2}-1$  in , tapering from a broad cordate base to a fine point, margin serrulate; sheath smooth, glabrous; ligalo very

short, rounded. Paurcle 6-12 in., rarely 1 in. diam., often interrupted, sometimes quite cylindric. Spikelets erect, very shortly pedicelled, pale green; gl I broadly ovate, acuminate; III tapering into a long rigid erect beak, palea 0 or imperfect — Generally cited as P. myurus, of Lamk, but as Nees has pointed out (Agrost. Bras. l.c.) Lamk's plant is Richards' P. myoswrus (= P. indicum). In Munro's herbarium P. myurus is, perhaps rightly, referred to P. amplexicaule, Rudge (Pl. Gui. i. 21), which is a much broader leaved plant.

20. P. assamicum, Hook. f.; slender, erect, leaves narrow base rounded, panicle spiciform cylindric very narrow interrupted, spikelets in ideasely crowded on the appressed branches, gl. I = † III 3-nerved, II and III lanceolate 5-nerved, III rather longer than II epaleate, IV ovatelanceolate thin smooth.

Assam, Masters, Griffith; DACCA, Clarke.

Stein 12-18 in. or more, ascending, as thick as a sparrow's quill, lower nodes rooting. Leaves 2-4 in, narrowed from the base to the acute tip, margins quite smooth, involute (when dry); sheath glabrous or mouth slightly hurry; ligule a narrow membrane. Panicle 3 in, hardly \( \frac{1}{4} \) in. diam, pale green, quite glabrous. Spikelets very shortly pedicelled; glumes thin.—I advance this species with hesitation. It is mearest to P myurus, differing in size, narrow leaves, very narrow panicle, smaller spikelets, and shorter glume III.

21. P. auritum, Presl ex Nees Agrost. Bras. 176; tall, erect, leaves linear-lanceolate base broadly cordate, panicle long contracted or more or less effuse much fastignately branched, branches erect, spikelets  $\gamma_i - l_o$  in. crowded on short branchlets solitary sessile or shortly pedicelled oblong or ovate-oblong subacute, gl. I =  $\frac{1}{3}$  III obtuse or acute nerves 3-5 arching. II and III subequal acute or acuminate 5-nerved, III paleate neuter, IV lanceolate acuminate smooth. Presl Rel Hieuk. i. 305; Trin. Pan. Gen. 176; Kunth Enum. Pl. i. 113; Steud. Syn Gram. 70; Thw. Enum. Pl. Zeyl. 361; Trim. Cat. Ceyl. Pl. 105; Baker Fl. Maurit. 437; Miq. Fl. Ind. Bat. iii. 456. P. insulicola, Steud. l. c. 73. P. javanum, Nees & Biilse in Msg. Pl. Jungh. 376; Miq Fl. Ind Bat. l. c. 453. P. maximum, Wall. Cat. n. 8715 F. P. patens, Bojer Hort. Maurit. cx Baker l. c. P. secundum, Wall Cat. n. 8701, 8707.

Marshes from BENGAL and the CONCAN to BURMA, TRAVANCORE, the MALAY

PENINSULA, and CEYLON -DISTRIB. Malaya, China, Mauritius?

Perennial Stem 3-6 ft., sometimes as stout as a goose-quill, soft. Leaves 8-14 by \(\frac{3}{4}-1\frac{1}{4}\) in., glabious or sparsely hairy beneath, as is the sheath; mouth villously bearded; ligule very narrow. Panicle 8-18 in., green, rachis scaberulous, branches 2-5 in., branchets and tascicles of spikelets subsecund. Spikelets green, glabrous, nerves strong; gl. I broadly ovate, II and III ovate-oblong; palea of III small; IV as long as III, white, thurly coriaceous.—The Ceylon specimens have longer (\(\frac{1}{10}-\frac{1}{2}\) in.) narrower and more acuminate spikelets than the normal.

22. P. interruptum, Willd. Sp. Pl. i. 341; stem tall very stout spongy below, leaves long flat base rounded or subcordate, panicle very narrow almost reduced to a spike, spikelets (many imperfect) \(\frac{1}{2}\)-\(\frac{1}{2}\) in. fascoled very shortly pedicelled ovoid rather turgid, gl. I = \(\frac{1}{2}\) III orbicular hyaline 5-nerved, II = III ovate-oblong obtuse strongly 9-nerved, 1II ovate-oblong obtuse strongly 9-nerved, 1II ovate-oblong obtuse strongly 9-nerved, 1II ovate-oblong obtuse, palea small, IV much smaller lanceolate acuminate polished white. Nees Fl. Afr. Austr. 51; Kunth Enum. Pl. i. 87; Roxb. Fl Ind.i. 286; Wall Cat. n. 8695 Excl. C; Thw. Enum. Pl. Zeyl. 361; Trim. Cat. Ceyl. Pl 104; Wight Cat. n. 1640, Griff. Notul. iii. 26, Ic. Pl. Asiat.

t. 139, f. 221 & t. 146, f. 2.; Dalz. & Gibs. Bomb. Fl. 316. P. caudatum, Thunb. Fl. Cap. i. 393. P. inundatum, Kunth Revis. Gram. i. 34; Enum. Pl. i. 88. P. spiciforme, Hochst ex A. Rich. Tent. Fl. Abyss. ii. 359. P. stagninum, Herb. Ham. ex Wall Cat. n. 8695 D (non Retz). P. turritum, Thunb in Mus. Nat. Acad. Upsal x. 148. P. uliginosum, Roth Nov. Pl. Sp. 50. Hymenachne interrupta, Buhse in Miq. Pl. Jungh. i. 377; Miq. Fl. Ind. Bat. ni. 458; Steud. l. c. 101.

Swamps; from the UPPER GANGETIC PLAIN to Assam and BURMA, and south-

ward to CEYLON-DISTRIB. China, Malaya, Afr trop.

Stem 3-5 ft, lower internodes often as thick as the thumb, rooting. Leaves 6-12 by  $\frac{1}{2}-\frac{1}{2}$  in., many-nerved, base hardly contracted; sheath smooth; ligule short, membranous. Spike 6-10 in. by  $\frac{1}{2}$  in. dam., strict; rachis stout, terete, channelled. Spikelets spreading, much longer than their pedicels, green, herbaccous.—Very near the American P. vilfoides, Trin. (fluvnatile, Nces). Bentham reduces P. interruptum to P. myurus, but they are very different plants.

23. P. indicum, Linn. Mant. ii. 184; stem slender, leaves linear glabrous or hirsute base narrow, panicle spiciform oblong or cylindric dense fld. branches very short, spikelets longer than their pedicel  $\frac{1}{10^{-3}}$  in. crowded ovoid or oblong subacute straight or curved glabrous or hispid, gl. I = about | III 3 nerved, II ovoid cymbiform obtuse or subacute 7-9-nerved, III as long as II oblong obtuse 7-9-nerved, palea minute, IV minute ovoid subscute. Retz. Obs. iii. 9; Kunth Enum. Pl. i. 133, Steud. Syn. Gram. 84; Trin. Diss. ii. 170, Pan. Gen. 84, Sp. Gram. Ic. 197; Roxb. Fl. Ind. i. 285; Thw. Enum. Pl. Zeyl. 361 (excl. CP. 909); Trim. Cat. Ceyl. Pl. 104; Benth. Fl. Hongk. 413, Fl. Austral. vii. 480; Franch. & Sav. En. Pl Jup. ii. 163. P. angustum, Trin. Sp. Gram. Ic. t. 334; Wight Cat. n. 1642; Sleud. l c. P. arcuatum, Br. Prodr. 189; Kunth l.c. 77; Griff. Notul iii. 39, 40, Ic. Pl. Asiat. t. 147, f. 1; Duthie Grass. N.W. Ind. 5, Fold. Grass N. Ind 9. P. contractum, Wight & Arn. ex Nees in Herb. Wight; Steud. I.c. 84. P. conglomeratum, Herb. Rottl.; P Linn. Mant. 324; Kunth l. c. 133. P. interruptum, Wall. Cat. n. 8695 C. partim. P. Johannes & incurvum, Herb. Linn, ex Munro in Journ, Linn. Soc. vi. 39. P. microstachyum, Lamk. Ill. i. 170, Encycl. 1v. 739; Kunth l. c. 88. P. myosurus, Rich in Act. Soc. Hist. Nat. Par. i. (1792) 106. P. myurus, Lank. Ill. i. 172. P. phalaroides, Roem. & Sch. Syst. ii. 452. P phleoides, Br ex Kunth l. c. Hymenachne indica, Bühse ex Miq Fl. Ind. Bat. iii. 458. H.? phalaroides, Nees Agrost. 276; Steud. l. c. 202 PAira indica, Linn. Sp. Pl. Ed. 2. 91. Panicum, Wall. Cat. n. 8696 B. C. (in part) D. E. F. (in part) G. H., 8697, & 8698.

Tropical and subtropical INDIA (ascending 6000 ft. in the Himalaya) from Garwhal eastwards and southwards. CEYLON.—Distrib. Trop. Asia and Australia. (Mexico, an alien).

P. inducum appears to pass insensibly into P. interruptum and P myosuroides, the former of which differs in its stouter habit, the latter in its caudiform spike and more minute rounded spikelets. Though so abundant in the Plains to the eastward of the Jumna, I have seen no specimens from the west of that river; nor from Africa. The following are the principal Indian forms, in describing which I have used the word spike in a conventional sense.

Var. indicum proper; stem 6-18 in. crect or decumbent at the base, leaves narrow, spikes  $\frac{1}{4-2}$  in. cylindric green whitish or blue-purple, spikelets  $\frac{1}{10}$   $\frac{1}{8}$  in. ovate-lanceolate acute straight or decurved glubrous or sparsely setose.—The common Plains form. P. phalaroudes, Roem. & Sch. is a common state with more setose spikelets; it is P. indicum, P, Wight Cat. 1641 B.

Var. elatum; glabrous, stem 3-4 ft stout erect, leaves 6-10 in. by \( \); in., spike 3-6 in. rather stout, spikelets  $\frac{1}{0}$  in. erect oblong-ovate acute violet blue rarely greenish.—Khasia hills, in wet places alt. 5-6000 ft. The nearest form to P. interruptum.

Var. pilosum; like var. elatum, but not so tall, more flaccid, leaves hirsute with spreading hairs.—Khasia hills, alt. 4-5000 ft.

Var. villosum; softly sılkily villous, stem 1-2 ft., leaves quite erect, spike 2-6 in., spikelets  $\frac{1}{8}$ - $\frac{1}{6}$  in. green or purplish ovate-oblong glabrous.—Panicum, No. 39, Herb. Ind. Or. Hook. f. & T.—Khasia hills, alt. 5-6000 ft.

Var. gracile; stem 1-2 ft. very slender simple or branched, leaves 4-6 by \( \frac{1}{3} - \frac{1}{3} \) in. flaccid, spikes 2-4 in. pale, spikelets \( \frac{1}{3} \) in. ovoid subacute glabrous spreading.—Nepal, Kumaon, Sikkim, &c.

Var. angustum; whole plant very slender spike of very minute loosely packed spikelets  $\frac{1}{10}$  in. long.—This, the *P. angustum* Trin., is a staired form.

Var. turgidum; stem 6-12 m., spike short cylindric or oblong very pale often proliferous, spikelets  $\frac{1}{2} - \frac{1}{0}$  in. oblong turgid setulose.—Panicum, Wall. Cat. n. 8697, 8698.—In wet places. Perhaps a diseased form.

24. **P. myosuroides,** Br. Prodr. 189; slender, leaves narrow, spikelets innumerable  $\frac{1}{18}$ — $\frac{1}{15}$ , in. densely crowded in an elongate cylindric curved caudiform panicle broadly obovoid or subglobose obtuse, gl. I about  $\frac{1}{5}$  III 3-nerved, II very convex and III 5-7-nerved, III oblong obtuse paleu muute, IV minute ovate-oblong. Kunth Enum. Pl. i. 77; Steud. Syn. Gram. 56; Benth. Fl. Austral. vii. 480 (excl. syn angustum); Duthie Folds. Grass. N. Ind. 11. P arcuatum, Wight Cat. n. 1639 (non Br.). P. angustum, Wight l.c. 1642 (non Trin); Wight Cat. n. 164. P. curvatum, Roab Fl. Ind. i. 286 (non Linn); Kunth l.c. 87 (excl. syn). P. indicum, Herb. Wight n. 3042; 'Thw. Enum. Pl. Zeyl 361 (in part). P. interruptum, var. contigua. Steud. in Pl. Ind. Or. Hohen. n. 1606 (non Willd.). P. multiflorum, Roab. Ic Pict. ined. t. 782. P. nervosum, 'Herb. Heyne ex Wall. Cat. n. 8696 A.—Panicum, Wall. Cat. n. 8696 A. G. F. (in part) G.—Sporobolus, Wall. Cat. n. 3766 ex Wight. Cat. n. 1642.

Throughout the hotter parts of India from NEPAL eastward to Assam and Burma, and southward to the Malay Peninsula and Crylon.—Distrib. China, Austral. Afric. trop.

Stem erect or shortly creeping. Leaves rarely \( \frac{1}{4} \) in. broad. Spiciform or rather caudiform paniels sometimes 8 inches long, tapering from base to tip, with rarely a short branch abruptly breaking out from near the base. Spikelets longer than their pedicels, green or purplish—This is unquestionably \( P. myosuroides, \) Br., and Roxburgh's \( P. curvatum, \) but I hesitate to cite all the authors who have taken up these names, in some cases probably from forms of \( P. indicum. \) In its ordinary state it is a very distinct grass, from its elegant tail-like inflorescence and minute obtuse spikelets, but I find it impossible to separate specimens with short spikes from states of \( P. indicum. \) P. angustum, Trin., is such a state, and is referred to myosuroides by Bentham, but its larger spikelets are rather those of true indicum.

25. P. curvatum, Linn. Syst. Nat. xii. 730; stem very slender, and narrow leaves flaccid, spikelets in a lax panicle with capillary flexuous branches, spikelets gibbously ovoid-oblong decurved, nerves very strong, gl. I minute, II cymbiform or almost galeate, III shorter than II ovate, palea linear-oblong, IV minute. Wight Cat. h. 1636; Thu. Enum. Pl. Zeyl. 360; Trim. Cat. Ceyl Pl. 105; Nees Agrost. Bras. 207, Fl. Afr. Austr. 50. P. costulatum, Bojer, mss. P. coryophorum, Kunth Revis. Gram. 93, t. 107; Enum. Pl. 88; Suppl. 66.—Punicum, Wall. Cat. n. 8742.

SOUTH DECCAN PENINSULA; Heyne, &c., Courtallam, Wight. CEYLON, Walker,

Thu artes .- DISTRIB. Madagascar, S. Africa.

Stem 6-18 in., prostrate, much branched, remotely leafy, nodes glabrous. Leaves 2-3 by  $\frac{1}{6}$  in , flat, sometimes sparsely harry; sheath long, slender; harle hardly any. Panicle 1-4 in., branches alternate, quite glabrous. Spikeleis  $\frac{1}{13}$   $\frac{1}{16}$  in., very strongly nerved, except gl. I, which is transversely obloug; II very strongly 11-nerved; III 3-5-nerved; IV ovoid, obtuse.—A very elegant small grass. Steudel (Syn. Gram. 85) has referred Sprengel's P. madagascarense (Syst. 1. 317) to this, but Sprengel's character "glumes obsoletely nerved" is irreconcidable.

#### Sect. V. Breviglumæ. (See p 27.)

26. **P. canaliculatum**, Nees in Wight Cat. n. 1624; stems very slender flaccid branched, leaves narrow, spikelets  $\frac{1}{10}$ .  $\frac{1}{1}$  in. solitary or few together clustered on distant very short branchlets along a capillary simple rachis ovate-oblong very shortly pedicelled, gls. membranous, 1 and II not  $=\frac{1}{2}$  III broadly ovate subequal, III ovate acute paleate male, IV as long as III lanceolate acuminate thin muriculate tip minutely 2-toothed and mucronulate. Steud. Nyn. Gram. 55 P. myurum, Wight ex Steud. l.c. P. stenostachyum, Thw. Enum. Pt. Zeyl. 436, Trim. Cat. Pl. Ceyl. 105. Aira interrupta, Rottl. ex Steud. Syn. Gram. 55.

Southern DECCAN PENINSULA, Wight. CEYLON; Jaffna, Herb. Rottler; Trinco-malee, Glenie.

Quite glabrous. Stems 2-3 ft., many from a small woody branched nodulose rootstock, erect or decumbent at the base. Leaves 3-10 by \$\frac{1}{6}\$ in., thin, flat, quite smooth, nerves very slender, tips setaceous, base narrow; sheaths smooth; ligule obscure, ciliate. Spike 3-8 in., almost capillary. Spikelets solitary, bunate, or in clusters of 3-6, on a very short branch, sessile or subsessile, pale, glustening; gl. I and II very broadly ovate, acute or obtuse; I 3-nerved; II rather the longest, 5-nerved; III faintly 5-7-nerved, its palea large, obtuse with broadly inflexed margins and green nerves at the smooth angles, which are faintly produced at the tips; IV very pale, dorsally flattened and channelled, 5-nerved; palea acute. Lodicules quadrately quie acute. Anthers linear. Style long, stigma short.—A very peculiar species.

27. **P. nodosum,** Kunth Enum. Pl. i. 97; stem creeping and rooting below, leaves linear base rounded or cordate, paniele broad rachis very slender scaberulous, branches very long filitorm striate bearing remote racemose or solitary spikes of few secund elliptic-oblong acute spikelets  $\gamma_2$ — $\gamma_3$  in. long, gl. 1 not  $\gamma_3$  III 3-5-nerved, II rather longer than I 5-nerved, III 5-7-nerved epaleate, IV elliptic-lanceolate acute thin smooth. Steud. Syn. Gram. 59; Benth. Fl. Hongk. 412; Thue. Enum. Pl. Zeyl. 360; Trim. Cat. Ceyl. Pl. 105. P. Arnottianum, Nees in Wight Cat. n. 1611, Herb. n. 3068; Steud. l. c. P. multinode, Presl Rel. Hunk. i. 303 (non Lamk.). P. violaceum, Llanos Fraym. 42.

BRIGAL, ASSAM, and southwards to MALACCA, TRAVANCORE and CHYLON.—DISTRIB. Malaya, China.

Stems 1-2 ft., slender, leafy. Leaves 2-5 by \(\frac{1}{2}\)-\(\frac{1}{2}\) in., flat, thin, and as well as their sheaths glabrous pilose or hirsute, base ciliate; ligule very short. Puncels 4-6 in., branches 2-3 in, solitary or fascicled. Spikelets pale green, sessile or very shortly pedicelled, glabrous or slightly harry; gl. IV. as long as III, dorsally

#### Sect. VI. Effusæ. (See p. 27.)

- \* Gl. I as long as III or nearly so. (The three following species are in no way allied.)
- 28. **P. æquiglume,** Hook f.; slender, leaves linear-lanceolate base narrow, panicle ovate lax, branches lax in alternate fascicles or whorls spreading laxly few-fid. and branchlets and pedicels capillary smooth, spikelets  $\frac{1}{12}$  in. solitary oblong obtuse faintly nerved, I = III oblong obtuse white nearly flat faintly 5-nerved deciduous, II broadly ovate subacute 9-nerved convex, III shorter than II oblong paleate male or neuter nerveless, IV much shorter than II stipitate broadly ovate obtuse sparsely pilose above or glabrous white.

NILGHIBI HILLS; Goodadoor Ghats, alt. 5000 ft., in a wood, Lawson.

- Stem 1-2 it., apparently geniculately ascending, smooth, purplish; nodes glabrous. Leaves 2-3 by 3-1 in., flat, green, smooth, 5-7-nerved and striate, midrib slender; hase rounded or narrowly cordate; sheath purple, margin fimbriately ciliate; ligule a row of hairs. Panicle 4 in, branches in 6-8 rather distant fuscicles of two or three, lowest 2½ in. long. Spikelets very pale; gl. I very deciduous (so that the mature spikelet appears 3-glumed), but leaving a distinct scar; II more coriaceous, nerves more distinct; III and its palea sometimes very small and empty.—A very curious grass.
- 29. **P. ovalifolium,** Poir. Encycl. Suppl. iv. 279; stem slender decumbent and rooting below, leaves 1-2 in ovate acuminate amplexicaul, panicle ovoid excessively branched, rachis branches and pedicels capillary, spikelets solitary  $\frac{1}{16} \frac{1}{10}$  in ovate subacute, gl. I. nearly = III, II hemispheric pubescent or hirsute 5-nerved, III flat obtuse, palea large, IV oblong acute dorsally rounded smooth, margins narrowly inflexed. Beaux. Fl. Owar. ii. 79. t. 110, f. 1; Kunth Enum. Pl i 113; Steud Syn. Gram 81; Benth. Fl Hongle 413. Thue. Enum. Pl. Zeyl. 359; Trim. Cat. Ceyl. Pl. 105; Duthne Grass. N.W. Ind 6. P. amplexicaule, Poir. (teste Beaux.) ex. Kunth l.c. P. arborescens, Linn. Sp. Pl. 59 (in part) (cf. Trim. in Journ. Linn. Soc xxiv. 135). P. brevifolium, Roxb. Fl. Ind. i. 306, & Herb. Linn. P. guineense, Desv mss ex Poir, Encycl. Suppl. iv. 279. P. tricarinatum, Steud. Nom. Ed. II ii 264, Syn. Gram. 94. Isachne tricarinata, Roth Nov. Sp. 57; Kunth Enum. Pl. 1. 136.—Panicum, Wall. Cut. 8737.

SIKKIM HIMALAYA, alt. 4000 ft; KHASIA HILLS, alt. 2000 ft.; MUNNEPORE, BURMA, the MALAY PENINSULA and CEYLON —DISTRIB. Malaya, China, trop. Afr.

- Stem geniculate and ascending below, leafy usually up to the panicle. Leaves membranous and sheaths glabrous chiate or huiry above or all over; ligule very short, chiate. Panicle ovoid. Spikelets variable in size; gl II very persistent—Resembles Sphænocaryum elegans and often mixed with it in Herbaria. As Trimen has pointed out (Journ. Linn. Soc. l. c.) this, according to Herb. Linn. & Fl. Zeyl. is P. arborescens, Linn., described as being as high as the loftiest trees. This error has no doubt originated from its having been accidentally assorted with an Arundinaria in Herb. Linn.
- 30. **P. turgidum**, Forsk. Fl. Æg. Arab. 18; shrubby, rootstock very stout creeping, stem woody, branches alternately or proliferously fascicled at the sheathed nodes, leaves short rigid, panicle erect glabrous branches solitary distant simple or sparingly divided, spikelets solitary  $\gamma_0^* \frac{1}{6}$  in. subglobose pale, gls. coriaceous cymbiform, I = III or nearly so orbicular 5-7-nerved, II broadly ovate acute 7-nerved, III acumi-

nate 9-nerved paleate male, IV small ovoid acute quite smooth polished. Del Fl. Ægypt. Ill. 51, t. 9, f 2; Nees Agrost Bras.i. 172 (in note); Trin. Pan. Gen. 221, Sp. Gram. Ic. t. 227; Kunth Enum. Pl. i. 97; Steud. Syn. Gram. 88; Duthie Fodd. Grass. N. Ind. 13.

SIND and CENTRAL INDIA, Duthre l. c .- DISTRIB. Beluchistan and westward to

Egypt.

Rootstock sometimes as thick as the little finger, root fibres strong woolly: branches 2-4 ft., hard, solid, smooth, sometimes as thick as a goose-guill, clothed at the base with imbricating scarious scales, and the nodes higher up with long scarious leaf sheaths, branches sometimes forming dense subglobose fascicles at the nodes 2-3 in. diam, with many short reduced panicles. Leaves at the base of the stem 2-3 m. long, flat, coriaceous linear-lanceolate, acuminate, smooth, at the upper nodes reduced to brown chartaceous open sheaths with a deciduous setiform blade. ligule a row of short hairs. Panicles very variable, 1-5 in. long; rachis and branches slender, subscaberulous; pedicels short, tips cupular. Spikelets subsecund, young ovate-lanceolate acute, mature turgid; palea of gl. III broad with ciliate keels; of IV corraceous like the gl. and shining. Anthers purple. Styles short, stigmas short, primrose-purple. — A remarkable grass, intermediate between Brachiaru and Efjusæ allied to no other Indian, with something of the habit of Spinifex. Duthie is my authority for the Indian habitats of this fine species; that of Sind is natural, the Central Indian I doubt exceedingly. As a species it is unmistakable. I should be disposed to refer it to the Brachiaria section, but Trinius places it under his section Miliaria; which answers to Ellusa.

- \*\* Gl. I much shorter than III.
- + Annual erect leafy grasses.
- 31. **P. miliaceum**, Linn. Sp. Pl. 58; leaves linear acuminate and sheaths clothed with long spreading hairs, base not cordate, panicle thyrsiform usually decurved or nodding, branches long slender suberect, spikelets  $\frac{1}{b}$ —\frac{1}{2}\) in. ovate-oblong cuspidately acuminate glabrous, glumes channelled between the nerves I = \frac{2}{3}\) III 5-7-nerved, II and III subequal 7-11-nerved, III paleate neuter, IV broadly ovate turgid 3-5-nerved polished. Host Gram. Austr. ii. 16, t. 20; Kunth Enum. Pl. ii. 104, Suppl. 81; Trin. Diss. iii. 186, Pan. Gen. 194, Sp. Gram. Ic. t. 221; Steud. Syn. Gram. 77; Reichlb. Ic. Fl. Germ. t. 82; Roab. Fl. Ind. ii. 310; Wall. Cat. n. 8716; Trim. Cat. Ceyl. Pl. 105; Aitchis. Cat. Panyab. Pl. 158; Duthie Grass. N.W. Ind. 5, Field & Gard. Crops. t. 23, Fodd. Grass. N. Ind. 9; Franch. & Sav. En. Pl. Jap. 165. P. asperrimum, Fisch. Cat. Hort. Gorenk. ex Jacq. Eclog. Gram. 46, t. 31; Nees Agrost. Bras. 199; A. Rick Tent. Fl Abyss. ii. 374; Steud. l. c. P. callosum, Hockst. ex A. Rick l. c. P. densepilosum, Steud. l. c. 72, ex Miq. Prolus Fl. Jap. 275. P. Milium, Pers. Syn. i. 83. P. pilosum, Herb. Roxb. & Herb. Heyne ex Wall. Cat. l. c. P. straatum, Spreng. Syst. i. 318. Milium esculentum, Moench Meth. 203. M. Panicum, Mil. Gard. Dict. Ed. 8, n. 1.

Cultivated or naturalized (Wild?) throughout the hotter parts of INDIA, AFRICA, and other hot countries.

Annual; stems tufted, 2-4 ft., stout, branching, leafy up to the panicle, often as thick as the little finger below. Leaves 6-12 by \(\frac{1}{2}\)-1 in., glabrous culiate or hirsute, base narrow, margin scabrid often culate; sheaths lax, deeply grooved, clothed with very long spreading or reflexed hairs; ligule of long hairs. Panicle 6-12 in., branches filiform, fascicled, densely crowded, scaberulous; pedicels often much longer than the spikelets, but sometimes much shorter. Spikelets green, erect, turgid; gl. IV pale, sometimes dorsally 5-streaked.—Closely allied to P. miliare and P. psilopodium with which it possibly hybridizes, but with much larger spikelets. I am

Annual. Stem 6 in. 3 ft., tufted, erect or geniculate below, leafy chiefly near the base; nodes rarely rooting. Leaves 3-10 by  $\frac{1}{8}-\frac{1}{4}$  in, usually flat, thin, acuminate, glabrous hairy or hirsute on both surfaces or beneath only; ligule short, fimbriate. Pamele 4-10 in., erect, often as broad as long. Spikelets green, yellow or purplish; gl. IV. variable in breadth, and in colouring, from pure white to greenishbrown, with 3-5 darker dorsal stripes.—Nees Fl. Afr. Austr. 51 has referred P. trypheron, Sch. to P. curvatum, L., a very different plant, and not a native of Bengal.

35. **P. humile**, Nees ex Steud. Syn. Gram. 84; dwarf, slender, leaves very narrow glabrous base narrow, panicle broad effuse lax-fld., branches subsolitary long spreading naked few-fld., branchlets capillary, spikelets  $\frac{1}{16}$  in. pedicelled ovate acute glabrous, gl. I =  $\frac{2}{3}$  III broadly ovate acuminate 3-nerved, III longest ovate-lanceolate acuminate 3-nerved, III ovate acute 3-5-nerved paleate neuter, IV much shorter broadly oblong obtuse pale shining. Thw. Enum. Pl. Zeyl. 360 (CP. 3243); Trim. Cat. Ceyl. Pl. 105; Duthie Grass. N. W Ind. 4, Fodd. Grass. N. Ind. 9. P. tenellum, Griff. Notul. iv. 21, Ic. Pl. Asiat. t. 139, f. 194 (non Roxb.).

The Panjab. Thomson; Bengal, Assam, Sikkim, Arracan, and southward to Ceylon.—Distrib. Borneo.

Annual. Stem 2-24 in., erect or geniculate below, much branched and often flowering from the base. Leaves 2-8 by  $\frac{1}{2}-\frac{1}{2}$  in., flat, base hardly cordate; sheath glabrous, or mouth sparsely hairy. Pancle 1-3 in., often as long as the whole plant, very laxly and diffusely branched. Spikelets minute, pale or reddish.

36. **P. hydaspicum**, Edgew. in Journ. Linn. Soc. vi. (1862) 207; dwarf, leaves linear-lanceolate hirsute base narrow, panicle effuse much branched glabrous, branches erecto-patent alternate rarely opposite and branchlets and pedicels filiform, spikelets  $\frac{1}{2^{10}-1_5}$  in. equalling or shorter than their pedicels solitary ovate acute glabrous, gls. membranous, nerves strong,  $I = \frac{2}{3}$  III ovate acuminate 5-nerved, II and III subequal ovate subacute 5-7-nerved, III paleate, IV elliptic obtuse brown shining. Aitchis. Cat. Panjab. Pl. 159; Duthie Grass. N.W. Ind. 4. P. humile, Aitchis. l. c.

The Panjab and Upper Gangeric Plain; from the Ravee to the Indus.

Edgeworth, &c. CENTRAL PROVINCES, Duthie.

Annual. Stem 6-18 m., geniculately ascending, rather stout below, branching from the very base. Leaves and sheaths clothed more or less thickly with long white hairs; sheaths inflated in some states. Leaves 1-2 by \(\frac{1}{2}\)-\(\frac{1}{2}\) in., flat, soft, acute; ligule a row of hairs. Panicle 2-4 in., peduncled, erect, ovoid rachis, and branches quite smooth, hardly flexuous. Spikelets pale green, except the dark brown gl. IV; palea of III smaller than the gl., oblong.

37. **P. cæsium,** Nees in Hook. Kew Journ. ii. (1850) 97; erect, stout, hairy, leaves linear base narrow subcordate, panicle large erect subthyrsiform much branched, branches suberect lower fascicled, spikelets  $\frac{1}{1^2} - \frac{1}{1^3}$  in. subsessile except the terminal broadly ovoid turgid nerves anastomosing, gl. I =  $\frac{1}{4} - \frac{1}{3}$  III ovate obtuse 5-nerved, II and III subequal ovate acute  $\frac{1}{2} - \frac{1}{2}$  nerved, palea linear, IV = II elliptic-ovate obtuse pale smooth shining. P. retuculatum, Thw. ex Trimen Cat. Ceyl. Pl. 105 (non Griseb.).—Panicum, Wall. Cat. n. 8744.

BENGAL, in the Jheels, J. D. H. & T. T. CACHAB, Keenan. MALACCA, Griffith. NICOBAR ISLDS, Kurz. CEYLON; Pasdoon Corl, Thwaites (CP. 3890).—DISTRIB. Borneo, N. Guinea, Philippines.

Annual. Stems 2-3 ft., densely tufted, erect from the root. Leares 6-10 by \(\frac{1}{2}\)-\frac{1}{2} in flat, soft, and sheaths more or less densely clothed with soft white spreading hairs; ligule a ridge of hairs. Panule 10-18 in. long; branches angular, scaberulous. Spikelets solitary or geminate, red-brown. Glumes rather soft; II deciduous; IV pale yellow or brownish, sessile, margins narrowly incurved.—The Bornean and Philippine specimens are more slender and less hairy than the Indian.

#### tt Perennials.

§ Glume I very small, suborbicular, white, nerveless; (0 in *P. sube-glume*); III 3-9-nerved, paleate or not.—Spikelets usually very shortly pedicelled.

36.\* P. maximum, Jacq. Ic. Pl. Rar. i. t. 13; Coll. i. 76; tall, stout, erect, leafy, leaves long broadly linear or linear-lanceolate glabrous, paniele large decompound, lower branches whorled usually hairy, pedicels unequal capillary, spikelets \( \frac{1}{10} - \frac{1}{12} \) in. solitary or in pairs elliptic-oblong acute or obtuse glabrous, gl. I = \( \frac{1}{4} \) III white 0-3-nerved, II and III subequal 3-7-nerved, III paleate male, IV elliptic subacute transversely rugulose. Sw. Fl Ind. Occ. i. 170; Nees Agrost. Bras. 166, Fl. Afr Austr. 36; Trin. Gram. Panic. 221; Pan. Gen. 180; Steud. Syn. Gram. 72; Wall. Cal. n. 8715 A. B (in part) D.; Trim. Cat. Ceyl Pl. 105; Aitchis. Cat. Panjab Pl. 159; Griseb. Fl. Brit. W. Ind. 549; Baker Fl Maurit. 436, Boiss. Fl. Orient. v. 439. P. altissimum, Brouss. Elench. Hort. Monsp. (1805) 42; Dalz. & Gibs. Bomb. Fl. Suppl. 98. P. confusum, Trin. ex Steud. Nom. Ed. II ii. 254. P. eburneum, Trin. Pan. Gen. 180; Steud. Syn. Gram. 73. P. Equisetum, Nees, ex Doell in Mart. Fl. Bras. ii. II, 206. P. fasciculatum, "Pl. Carib. non Sw.," Griseb. Fl. Brit. W. Ind. 549. P. gongylodes, Jacq. Eclog Gram. 30, t. 21. P. jumentorum, Pers. Syn. i. 83; H. B. & K. Nov. Gen. & Sp. i. 104; Thw. Enum. Pl. Zeyl. 361: Duthie Grass N.W. Ind. 5, Fodd. Grass. N. Ind. 9. P. læve, Lamk. Ill. i. 172. P. longipes, Wight & Arn. in Wight Cat. n. 1638. P. megiston, Schult. Mant. ii. 248. P. pamplemoussense, Steud. l. c. 71. P. polygamum, Sw. Prodr. Veg. Ind. Occ. 24. P. praticolum, Saltzm. ex Doell in Mart. Fl. Bras. ii. II, 203. P. trichocondylum, Steud. l. c. 74. P. tuberculatum, Presl Rel. Hænk. i. 307.

Cultivated in many parts of INDIA.—Native of Africa.

Perennial? 8-10 ft. high; stem branching, branches erect, nodes naked or bearded. Leaves 1-2 ft. by \(\frac{1}{2}\)-1 in., gradually narrowed from a small rounded or auricled base to a long filiform point, quite smooth, nearly glabrous; sheaths long, mouth villous; ligule of long hairs. Panicle 1-2 ft, quite erect, branches erect, filiform, smooth; pedicels usually shorter than the spikelets, glabrous or very sparsely pubescent, bright green, glistening, gls. thin.—This grass is described both as an annual and a perennial. Trinius' description of P. eburneum I think refers it to maximum; it is described as from Nepal.

Var. β, Boiss. l. c.; spikelets shortly hairy, gl. III neuter.—Peshawur, Aitchison.

Affghan.—Apparently a smaller plant than typical P. maximum.

37. P. repens, Linn. Sp. Pl. Ed. 2, 87; stem creeping and stoloniferous below, leaves distichous linear-lanceolate flat or convolute glaucous, paniele usually contracted irregularly branched, branches 2-3-nate strict, spikelets  $\frac{1}{10}$  in. sessile or shortly pedicelled ovate-lanceolate acute white, gl. I =  $\frac{1}{6}$  111 orbicular, II and III subequal ovate acute sub-5-nerved, III paleate or not male or neuter, IV ovate acute smooth. Subth. Fl. Græc. 1. t. bl.; Nees Agrost. Bras. 171; Kunth Enum. Pl. i. 103; Trim. Cat. Ceyl. Pl. 105; VOL. VII.

Aitchis. Cat. Punjab Pl. 160; Duthie Grass. N.W. Ind. 6, Fodd. Grass. N. Ind. 11; Boiss. Fl. Orient vii. 440; Benth. Fl. Hongk. 412. P airoides, Br. Prodr. 190; Kunth l.c. 122. P. aquaticum, A. Rich. Tent. Fl. Abss. ii. 373. P. arenarium, Brot. Fl. Lusit. 1.82, Phyt. Lusit. i. 15, t. 6; Nees Agrost. Bras. i. 170, Fl. Afr. Austr. 37; Tim. Pan. Gen. 181. P. coloratum, Cav. Ic. ii. 6, t. 110. P. convolutum, Beauv. ex Spring. Syst. i. 319. P. hvgrocharis, Steud. l.c. 72. P isohæmoides, Retz. Obs. iv. 17; Rottl. in Neue Schrift iv. (1803) 185; Steud. l.c. 98; Wight Cat. n. 1627; Wall. Cat. n. 8710. P. multinode, Lamk. Encycl. iv. 747 (ex Nees Agrost. Bras.). P. paludosum, Hochst. ex Steud. l.c. 72 (not of Roxb.). P. polystachion, Ucria, Hort. Reg. Panorm. 54. P. psilopodium, Trin. ex Wight Cat. n. 1633 C.; Herb. Strach. & Winterb. No. 5. P. Roxburganum, Schult. Mant. 11. 245. P. sarmentosum, Hb. Wight ex Wall. Cat. 8710 C. PP. uliginosum, Roxb. Fl. Ind. 1. 308; Wall. Cat. n. 8710 A; Kunth l. c. 126.—Panicum, Wall. Cat. n. 8714 E, 8746.

Throughout India, by banks of streams and in dry places, from the Panjab eastwards and southwards. Ceylon, Walker, Gardner.—Distrib. S. Europe, Asia, Afr., Amer.

Stems 2-6 ft., erect or ascending from a stout creeping rootstock, leafy, simple or branched below, nodes rooting. Leaves 3-6 in, strict, often glaucou, usually narrow and involute, smooth, glabrous or harry on the upper surface, margins sometimes toothed towards the cliate rounded base; sheaths with cliate mar\_ins; ligule a narrow coriaceous ring. Panicle 3-8 in, branches usually erect, very slender, angular, scaberulous; pedicels short, tip cupular. Spikelets erect, quite glabrous; gl. I membranous, nerveless or 3-nerved; palea of III truncate; IV shortly broadly stipitate, pale. Anthers red.—Roxburgh distinguishes his P. uliginosum from P. paludosum (proliferum, Lank) by the tetragonous smooth branches of the panicle, whereas in P. paludosum these are trigonous with acute hispid angles. I have seen no authentic specimens of his P. uliginosum, but his figure of "Gundru" (the native name which he gives for it) does not show this character of the panicle.

38. P. proliferum, Lam. Encycl. iv. 747; stem erect from a floating base. leaves linear or ensiform acute serrulate usually flat, panicle with long virgate spreading branches bearing short few-fid. branchlets and solitary sessile or shortly pedicelled spikelets which lie parallel to the branchlet, spikelets  $\frac{1}{8}$  in. lanceolate, gl.  $I = \frac{1}{6}$  III orbicular, II ovate acuminate 9-nerved, III lanceolate 9-nerved paleate or not, IV oblong acuminate smooth. Nees Agrost. Bras. 170; Kunth Enum Pl i. 100; Steud. Syn. Gram 71; Muell. Fragment. viii. 191 (the King's Creek plant). P. aurantiacum, Ham. ex Wall. Cat. n. 8714 B. P. gongylodes, Jacq. Eclog. Gram. iii. t. 21. PP. decomp situm, Duthre Grass. N.W. Ind. 3. P. decompositum, var. paludosum, Trim. Cat. Ceyl. Pl. 105. P. elephantipes, Nees Agrost. Bras 165. P. Elhottu, Trin. ex Nees l c. 170. P. fistulosum, Hochst. ex Steud. I c. 71. P. natans, Koen. ex Trin Panic. Gen. 237. P. paludosum, Roxb. Fl. Ind. i. 307; Wall. Cat. n. 8711; Nees Fl. Afr. Austr. 35; Kunth l. c. 126; Griff. Notul. 37, Ic. Pl. Asiat. t. 139. f. 127; Duthre Fold. Grass. N. Ind. 11. P. repens, Thw. Enum. Pl. Zevi. 360: Trim Cat. Ceyl. Pl. 105; Trin. Pan. Gen. 179. P. rigidum, Heyne in Herb. Rottl.—Panicum, Wall. Cat. n. 8714A. (in part) B. C. D.

Marshes and still waters throughout the low countries of India, from the Panjab to Assam and southward. CEYLON.—DISTRIB. Tropics generally.

Perennial. Stem 2-8 ft. or more; lower nodes spongy, as thick as the little finger. Leaves  $(-12 \text{ by } \frac{1}{4} \cdot \frac{2}{3} \text{ in.})$ , base broad but hardly cordate; sheaths loose;

ligule a ridge of hairs. Panicle 6-10 in., often nearly as broad, lower branches whorled and fascicled, trigonous, scaberulous. Spikelets green, variable in size, terete, palea of gl. III 0, or minute, or linear, neuter or male rarely bisexual.—Closely alhed to (if not a more luxuriant aquatic form of) P. repens, and confused with it as to synonymy; but a coarser plant, with a more spreading panicle, more acuminate spikelets and a more oblong gl. IV. Further, P. repens has normally shorter glaucous narrower convolute leaves, and a more irregularly branched panicle. Also very near the Australian P. decompositum, Br., which has normally a decompound panicle with more slender spreading branches and branchlets, and distant solitary spikelets.

Dr. Stapf has made for me a careful analysis of the spikelets of a large series of specimens, and I have made many myself, with the view of testing the value of the absence or presence of the palea in gl. III, and its sexuality. As examples he finds in 9 spikelets taken promiscaously 3 epaleate and 6 with reduced paleas. In 5 others all are paleate and male, in 3 others all paleate but neuter. In 9 others all epaleate. In a branch with 10 spikelets, 9 of them had gl. III paleate, 1 epaleate. Of 6 spikelets from near the base of a brunch, 3 epaleate, 2 male with a rudimentary ovary, 3 paleate and female. Of 8 spikelets from a branch in the lower part of a

panicle, 2 lowest epaleate, 6 paleate and bisexual.

39. P. subeglume, Trin Pan. Gen. 204; stem slender, leaves linear, base narrowed, panicle large effuse, rachis and branches flexuous capillary, spikelets  $\frac{1}{12}$  in pedicelled elliptic-oblong subacute, gl. I and II absent, III and IV equal, III 5-7-nerved glabrous or silky, IV elliptic-oblong or lanceolate cuspidate. Steud Syn. Gram. 84. P. arcuatum, Br. ex Nees in Wight Cat. n. 1639 (non Br. Prodr.). P. Brownianum, Wight & Arn. ex Steud. l.c. 98. P. Torreyanum, Wight et Arn. ex Steud. Non. Ed. II, in. 264; Wight Cat. n. 1634. Milium capillare, Roth Nov. Sp. 39; Kunth Enum. Pl. i. 67. M. tomentosum, Koen. ex Rottl. in Ges Naturf. Fr. Neue Schr. iv. (1803) 220; Steud. Syn. Gram. 34; Kunth l.c. 66.—Isachne? Wall, Cat. n. 8659.

SOUTHERN DECCAN, Heyne; Madura, Rottler; Palaveram, Wight.

Perennial. Stem 1-2 ft., soft. Leaves 3-6 by ½ in. or less, finely acuminate, and sheaths glabrous softly hairy or tomentose; ligule short, membranous. Panicle 3-7 in, spreading, glabrous; lower branches suberect, alternate, divided from the base. Spikelets much shorter than their pedicels, erect, dorsally compressed. Grain linear-oblong, obtuse.—The absence of gl. I and II are characters of Paspalum, but the habit and inflorescence are those of a Panicum.

- §§ Gl.  $I = \frac{1}{8}$  to  $\frac{3}{4}$  III, 5-7-nerved.
- a Spikelets acute or acuminate. (See also P. auritum)
- 40. **P. incisum**, Munro ex Clarke in Journ. Linn. Soc. xxv. (1890) 84, t. 33; stem slender, leaves long linear-lanceolate base narrow, panicle effuse very lax, rachis branches and pedicels very slender subscaberulous, pedicels very long, spikelets \(\frac{1}{2}\) in. remote solitary elliptic acuminate, gl. I about = \(\frac{2}{3}\) III ovate acute 1-3-nerved, II and III subequal, II 5-nerved, III 7-nerved, palea short, IV elliptic acuminate quite smooth polished margin narrowly inflexed. Munro Cat. Pl. Griffith, &c., ined. p. 56.

UPPER ASSAM; Naga hills, Griffith; Nambre forest, alt. 400 ft., Clarke.

Perennial. Stem 1-2 ft., quite glabrous. Leaves 5-10 by \(\frac{1}{2}\)-\(\frac{2}{3}\) in., finely acuminate; ligule elongate-oblong, scarious. Punicle 3-6 in., usually sessile as it were on the upper leaf sheath. Spikelets many times shorter than their pedicels, obscurely articulate at the base; glumes distant on a distinct inarticulate racheola; II fugacious; IV rather shorter than II, brown.—Altogether resembles an Isachne in habit,

and in the spikelet being obscurely jointed on the pedicel. A very closely allied plant collected by Reddome in the Anamallay hills has a much broader rounded and cordate leaf-base, the spikelets are too immature for description.

41. **P. antidotale**, Retz. Obs. iv. 17; tall, glabrous, branching, leaves linear flat base rounded, panicle large effuse or contracted, branches slender glabrous lower fascicled divided from the base, spikelets  $\frac{1}{10}$  in. shortly pedicelled solitary or clustered ovoid acute, gl. I and II with broad membranous margins,  $I = \frac{1}{2}$  III broadly ovate acute 5-nerved, II and III subequal strongly 5-7-nerved, II obtuse, III paleate, IV ovate or oblong acute smooth. Trin. Gram. Pan. 227, Pan. Gen. 195; Nees Agrost. Bras. 201; Kunth Enum Pl. i. 125; Steud. Syn. Gram. 77; Wight Cat. n. 1630; Thw. Enum. Pl. Zeyl. 360, Trim. Cat. Ceyl. Pl. 105; Aitchis. Cat. Panjab Pl. 158; Duthie Grass. N.W. Ind. 2, Indig. Foodd. Grass. t. 3, Fodd. Grass. N. Ind. 4; Benth. Fl. Austral. vii. 483; Boiss. Fl. Orient. v. 440. P. maximum, Wall. Cat. n. 8715 B (in part) C (in part). P. polygamum, Herb. Madr. ex Wight Cat. n. 1630. P. pruinosum, Bernh. ex Trin. Pan. Gen. 191. P. subalbidum. Kunth Revis. Gram ii. 397, t. 112, Enum. 101. P. tenue, Roxb. ex Wight Cat. l. c.

The PANJAB and UPPER GANGETIC plain, and southward to the S. DECCAN and

CEYLON. - DISTRIB. Affghan., Afric, trop Austral.

Perennial, sometimes shrubby, with a stout creeping rootstock bearing villously sheathed stolons; branches as thick as a crow-quilt; internodes solid, woody, terete, smooth; nodes thickened. Leaves 6 by \$\frac{1}{6}\$ in., narrowed from the base to the slender tip, flat, rather rigid, smooth on both surfaces, base narrow rounded, midrib distinct; nerves many, slender; sheaths quite smooth; ligule a ridge of hairs. Panicle 6 in. high, branches filiform, lower nearly 2 in. long, sparingly divided; branchlets rather short; capillary. Spilelets quite glabrons; gls. rather thin, pale green; palea of III nearly as long as the gl., 2-toothed, nerves strong or slender. IV shorter than III, shotly stipitate, coriaceous, margins incurved; palea as large as the gl. Lodicules minute, orbicular. Filaments very short; anthers linear-oblong. Overy narrow; styles short, free, stigmas broad.—Roxburgh describes P. tenue as having "seeds ovate transversely waved," whereas they are quite smooth in P. antidotale.

42. **P. elegantissimum**, Hook, f.; tall, erect from the base, very slender, leaves subradical very long narrow softly pubescent base narrow, peduncle very long and slender, panicle effuse very broad laxly few-fid., branches long alternate distant solitary naked below and branchlets capillary quite smooth, spikelets  $\frac{1}{10}$  in. few on each branchlet shortly pedicelled ovate acuminate, gl. I about  $\frac{1}{3}$  III ovate mucronate 5-7-nerved, II and III stipitate subequal ovate cuspidately acuminate, II 7-nerved 5 of the nerves strong above, III nerves 7 slender, palea small ovate, IV elliptic-oblong obtuse as long as II white shining smooth.

MALAY PENINSULA; Perak, Ridley.

Perennial. Stem 2-3 ft., tuited, and branched at the very base, stiff. Leaves chiefly subradical, 10-18 by \( \frac{1}{2} \) in., gradually narrowed from the base to the slender tip, strict, suberect, softly harry all over; mouth of sheath villous; ligule a fascicle of hairs. Pancele 12-18 by 6-12 in., scaberulous; branches 1-3 in. apart. Spakelets very few and remote, reddish; gl. I inserted much below the others; IV sessile by a broad base.—A most elegant grass.

43. P. acroanthum, Steud. Syn. Gram. 87; glabrous, erect, very slender, leaves narrow base contracted, panicle broad very effuse lax-fid.,

branches subsolitary naked below, and long spreading few-fid. naked branchlets capillary, spikelets  $\frac{1}{12}$  in. long-pedicelled ovate-oblong acute glabrous or sparsely puberulous, gl. I =  $\frac{1}{3}$  III ovate obtuse 1-nerved, II and III subequal subacute 5-nerved, III epaleate, IV elliptic-oblong subacute palea quite smooth.  $Miq.\ Prolus.\ FV.\ Jap.\ 165$ ;  $Franch.\ G$  Sav.  $En.\ Pl.\ Jap.\ 11.\ 162$ .

UPPER ASSAM; Mishmi Hills, Griffith .- DISTRIB China, Japan.

Perennual. Stem 2-3 ft., creet, not or rarely branched; nodes glabrous. Leaves 3-5 by  $\frac{1}{6-\frac{1}{8}}$  in., thin, flat, glabrous, as are the sheaths; ligule a few hairs. Panicle 3-4 in. long and broad, very lax, open, with few scattered brownish or greenish spikelets; branches branchlets and pedicels perfectly smooth, gl. I II & III membrauous; IV thinly cornaceous, sessile.—I find no trace of a palea in gl. III of any specimen. No other species of this group has sparsely pubescent spikelets, except var.  $\beta$  of P. maximum.

- β. Spikelets obtuse or subacute.
- \* Gl. III. epaleate.
- 44. **P. montanum**, Roxb. Fl. Ind. i. 313 (excl. descr. gl. IV.); stem tall firm, leaves long lanceolate base broad deeply cordate, panicle large loose, rachis branches and pedicels very long capillary smooth, spikelets  $\frac{1}{16}-\frac{1}{12}$  in solitary oblong obtuse or subacute, gl. I = \frac{1}{4} III ovate 5-nerved, III and III subequal obtuse 5-nerved, III epaleate. IV ovate subacute smooth. Kunth Enum. Pl. 126; Benth. Fl. Hongk 412; Thwo. Enum. Pl. Zevl. 360; Trum. Cat. Pl. Ceyl. 105. P. barbatulum, Wall. ms P. courtallense, Nees & Arn. ex Wight Cat. n. 2342, Herb. 1362, 3049; Steud. Syn. Gram 83. P. euchroum, Steud. l. c. 98. P. notatum (montanum, Roxb), Wight Cat. 1362 (non Retz). P. trinapallum, Hb. Ham. ex Wall. Cat. n. 8722 A.—Panicum, Wall. Cat. n. 8719, 8722, 8739.

Hotter hilly parts of India, from the lower Himalaya in Garwhal, Duthie, to Sikkim, Burma, the Khasia Hills, and southward to Penang and CEYLON.—DISTEIB.

Malaya, China, Philippines.

Perennial. Stem 3-4 ft. or more, smooth, hard, sparingly branched. Leaves 5-7 by \{\frac{3}{4}-1\}\{\frac{1}{2}\}\] in., thin, glabrous or pilose, smooth or scaberulous beneath, striate, base ciliate, midrib sometimes excentric; sheath glabrous or pubescent, mouth hairy; lagule obscure. Pancle 8-18 by 8-10 in.; branches whorled or alternate, axils sometimes glandular, lower strict and unbranched from 1-3 in. Spikelets terete, glabrous or faintly hairy; gl. II fugacious.—I do not find gl. IV to have 3 stripes as described and figured by Roxburgh, nor is it as broad as in his figure; but that the plant I have described is Roxburgh's is confirmed by a specimen so named by himself. P. montanum has been referred by Wight to the Sumatran P. notatum, Retz (Obs. iv. 18), but that plant is described as having scabrid branches of the panicle, purple spikelets, and acute glumes. The black spots at the axils of the panicle seen in dried specimens of both species, are probably due to a glandular secretion. Wallhch's n. 8739, from Ava, has very long pedicels and broad glumes, and a broader gl. IV, but the latter is narrower than in Roxburgh's figure. Duthie (Grass. N.W. Ind. 5) gives Stewart as authority for this grass being found in marshes near Peshawur, but I suspect that Isachne himalasca was taken tor it.

45 **P. humidorum,** Ham. in Wall. Cat. n 8721; tall, slender, leaves linear base narrowly cordate, panicle large loose, rachis branches and (rather short) pedicels capillary smooth, spikelets  $\frac{1}{20}$  in. ellipsoid obtuse glabrous, gl. I =  $\frac{2}{3}$  III obtuse 3-nerved, II and III obscurely 5-nerved, III epaleate, IV ovate or oblong smooth.

Assam; Goalpara, Hamilton. Silher, Cachae, the Khasia and Naga Hills, and the Jheels

Perennial. Gregarious in water (Clarke). Habit of P. montanum, but much more slender, with narrower leaves 4-8 by  $\frac{1}{4}-\frac{1}{3}$  in a smaller panicle, with shorter pedicels and much smaller spikelets. Gl. II fugacious.

Var. ? perakense; stem robust nearly as stout as a goose-quill below, leaves ½ in. broad, spikelets broader, nerves stronger. Perak, King's Collector (n. 2546).—

Probably a different species.

46. **P. khasianum**, Munro mss.; tall, leaves linear or linear-lanceolate base narrowly cordate, panicle very large branches very long slender smooth, pedicels long or short, spikelets subsolitary  $\frac{1}{18}$   $\frac{1}{12}$  in. ellipsoid subacute glabrous, gl. I minute much shorter than III, nerves 0 or 3 obscure, II and III subequal 5-nerved, III epaleate, IV elliptic-oblong subacute smooth.

E. NEPAL and SIEKIM, alt. 4-7000 ft., J. D. H., Clarke. KHASIA HILLS, in

marshes, alt. 4-6000 ft., Griffith, &c.

Perennial. Stem prostrate and creeping below, then erect, 3-6 ft. Leaves 6-12 by 3-14 in., thin, glabrous hairy or subscabrid, many-nerved, base usually contracted with incurved auricles, not or obscurely ciliate; sheath smooth or hispidly hairy, mouth bearded; ligule very short, ciliate. Panicle 6-12 in, often as broad; lower brunches nearly as long, solutary or fascicled, unbranched below.—Near P. montanum, differing in the narrower leaf-base, very short gl. I, and in gl. II not fugacious. Also neur P. sarmentosum, from which the minute gl. I distinguishes it.

### \*\* Gl. III paleate.

47. **P. sarmentosum**, Roxb. Fl Ind. i. 308; tall, branched, scandent, leaves long base narrow rounded, panicle pyramidal or ovoid loosely branched glabrous, rachis smooth, branches half-whorled capillary, spikelets  $\frac{1}{18} - \frac{1}{16}$  in., sessile or shortly pedicelled ovoid tips obtuse ciliolate, gl. I =  $\frac{1}{3}$  III or more obtuse or subacute 3-5 nerved, II and III subequal orbicular nerves 5 broad, III palea small narrow, IV small ellipsoid subacute dorsally rounded smooth. Kunth Enum. Pl. i. 126; Steud. Syn. Gram. 98. P. micrognostum & P. vacıllans, Steud. l. c. 75; Miq. Fl. Ind. Bat. ini. 456. P. concinnum, Nees in Hook. Kew Journ. ii. (1850) 97; Steud. l. c. 78; Miq. l.c. 4:7. P. incomptum, Trin. Diss. ii 200, Gram. Panic. 200, Sp. Gram. Ic. t. 232; Kunth l. c. 112; Steud. l. c. 88; Nees in Mart. Fl. Bras. ii. 207; Herb. Wight (Kew Distrib. n. 6492). P. maximum, Wall. Cat. n. 8715 E. P. tjicoylense. Steud. l. c. 70. ? P. incomptum, Duthie Grass. N.W. Ind. 4. —Panicum, Wall. Cat. n. 8709.

ASSAM, SILHET, CACHAE, and the KHASIA HILLS, ascending to 5000 ft., CHITTAGONG, BURMA, and the MALAY PENINSULA.—DISTRIB. Malay Islds., China, Tonkin.

Perennial. Stems attaining 50 ft., often as thick as a goose-quill, solid, pubescent or glabrous, with whorls of long wiry slender branching roots at the bearded nodes below, whence the flowering branches issue. Leaves 12-15 by \frac{1}{2}-1\frac{1}{2}\text{ in., linear-lanceolate, finely acuminate, base rounded or subcordate, smooth or hairy on both surfaces or beneath especially, many-nerved; sheaths smooth or sparsely hairy; ligule a brush of hairs. Panicle 6-12 in., very variable, branches erect or spreading, long or short, branchlets often creeping and entangling, straight or flexuous. Spikelets erect or spreading.—Duthie gives P. incomptum as a native of Garwhal, alt. 4-5000 ft., but I have not seen P. sarmentosum, Roxb. from the westward of Assam, and I suspect that P. montanum is the plant intended. Of P. concumum, which is

Cuming's n. 2284, Miquel says, stem villous under the panicle. Benth. (Fl. Hongk.) refers concinuum to sarmentosum, and includes incomptum. I do not find the Hongkong specimen in Herb. Kew. There are no spe imens of this in Herb. Linu. Soc. and Wallich's ticket No. 8709 has A. Hb. Finlayson, B. Silhet, C. Penang, D. Tavoy, E. Singapore.

## Sect. VII. PTYCHOPHYLLUM. (See p. 28.)

48. P. plicatum, Lamk. Encycl. iv. 736; perennial, leaves plicate from linear-lanceolate to elliptic-oblong, panicle elongate lax-fld., branchlets often ending in a stiff bristle, gl.  $I = \frac{1}{2}$  III or more orbicular-ovate 5nerved, II = 1 IV or longer 5-7-nerved obtuse, III = IV dorsally flattened acute 5-9-nerved, IV ovate-lanceolate rugulose. Jacq. Eclog. Gram. i. t. 1; Trin. Gram. Panic. 183, Gen. Pan. 161, Sp. Gram. Ic. t. 223; Kunth Enum. Pl. 1. 94; Wall. Cat. n. 8705; Griff. Notul. iii. 24, Ic. Pl. Asiat. t. 139, fig. 229; Thw. Enum. Pl. Zeyl. 360 (excl. P. costatum); Trim. Cat. Ceyl. Pl. 105; Duthie Grass. N.W. Ind. 6, Fodd. Grass. N. Ind. 11; Benth. Fl. Hough. 411; Anderss. in Wulp. Ann. vi. 944. P. amplissimum, Steud. l. c. 54. P. asperatum, Kunth Revis. Gram. i. 39, Enum. Pl. l c. 39. Migu l Fl. Ind. Bat in. 456. P excurrens, Trin. Pan. Gen. 131, 249, Sp. Gram. Ic. t. 49, Kunth Enum i. 91; Benth. Fl. Hongk. 412, excl syn. P. Klemianum, Nees ex Anderss. in Walp. Ann vi. 946. P lene, Steud. l.c. 54. P. mauritanum, Willd. ex Spreng. Syst. i. 305. P. nepalense, Spreng. l.c. 321; Kunth Enum. i. 94; Dalz. & Gibs. Bomb. Fl. 291; Artchis. Cat. Panjab Pl. 160; Miq. l. c. 448. P. nervosum, Roxb. Fl. Ind. i. 311; Wall. Cat. n. 8702. P. neurodes, Schult. Mant. n. 228; Wight Cat. n. 1647; Anderss. l. c. 945; Duthie Grass N.W. Ind 5. P. paucisetum, Steud. 1 c. 52. P. palmifolium, Koen in Naturforsch. xxiii. (1788) 208; Kunth Enum. 93; Anderss. 1 c. 945. P. Wallichianum, Nees Fl. Afr. Austr. 49, Mig. l.c. 449 — Panicum, Wall. Cat. n 8703.

Throughout the moister hilly parts of India, from Kumaon in the Himalaya eastward, ascending to 5000 ft. in Sikkim, the Shan Hills in Burma, the Nil-Ghiris, alt. 6000 ft., the Malay Peninsula, and Ceylon.—Distrib. China, Mulay Islands.

\* Stem 1-8 ft., erect or ascending from a woody branched stock, from the thickness of a sparrow's to a swan's quill, leafy. Leaves 6-24 by \(\frac{1}{2}\)-4 in., finely acuminate, sessile on the sheath or petioled, membranous or chartaceous, glabrous or sparsely hairy ; sheath sometimes hispid, mouth ciliate ; ligule short. Panule thyrsoid, striate and erect with short branches, or effuse and drooping, 1-2 tt. long, with branches 2-4 in. long (spiciform in reduced states); branches, pedicels and their setiferous scabrid tips green or purplish. Spikelets & in., ovoid; gl. I = & III or less, very broadly ovate, obtuse or acute, 5-7-nerved, paleate or not, male or neuter; IV acuminate, coriaceous, more or less rugulose.—After a study of an immense suite of specimens of this species from all parts of India, I am unable to follow Andersson (in Walp. Ann. l. c.) in his separation of it into plicatum, palmifolium, neurodes and the seven vars. of the latter. These are, I think, all forms chiefly dependent on climate and age. Lamark's P. plicatum was described (1797) from a cultivated specimen of uncertain origin (Mauritius or St. Domingo), but Jacquin's excellent figure of it leaves no doubt of its identity with the Indian plant, for it resembles no American one. It has been widely cultivated for nearly a century, and a garden specimen in Beutham's Herb. supports the identification. I doubt P. palmyfolium of Poilet being specifically different, it is described from an E Indian specimen, though Grisebach (Fl. Bit. Ind. 547) identifies it with the W. Indian P. sulcatum, Aubl. Grisebach distinguishes palmifolium from plicatum by gl. II of the latter shorter than IV, and longer in palmifolium, but I find this a most variable character and not borne out by the material that Grisebach worked upon. He also describes gl. IV as ellipsoid, but it is ovate-lanceolate in both. Whether P. sulcatum is specifically different may be doubted. P. excurrens, Trin., is a small narrow-leaved flaccid (perhaps young) state, with a very slender panicle and erect branches; it is Wall. Oat. n. 8703, and a common Himalayan form. Wall. Cat. n. 8705 is a gigantic form from Silbet, where I found it abundantly.

48.\* P. flavescens, Sw. Prodr. Veg. Ind. Occ 23, Fl. Ind. Occ i. 158; annual, leaves plicate linear-lanceolate, panicle erect branches spreading simple pubescent and bristly, spikelets subsecund, gl. I = ½ III orbicular obtuse 3-nerved, II = ½ IV apiculate 5-7-nerved, III = ÎV 5-7-nerved paleate male, IV ellipsoid acuminate transversely rigulose. Kunth Enum. Pl. i. 128; Steud. Syn. Gram. 80; Griseb. Fl. Brit. W. Ind. 547. P. barbatum, Telf. ex Wall Cat. n. 8689 D. P. costatum, Roxb. Fl. Ind. i. 312; Wall. Cat. l. c.; Kunth l. c. 93; Steud. l. c. 64; Anderss. in Walp. Ann. vi. 947. P. fasciculatum β, Nees Agrost. Bras. 152. P. mauritianum, Herb. Willd. ex Spreng. Syst. 1. 305. P. paractaenioides, Trin. in Mem Arad. Petersb Ser. 6, iii. II (1835) 219. P. Thouarsianum, Nees ex Steud. l. c. 62. P. plicatum var. costatum, Baker Fl. Maurit. 437. Setaia mauritiana, Spreng. Syst. i. 305 (ex Baker).

Cultivated in Hort. Bot. Calc., Wallich. Siam? Herb. Finlayson .- DISTRIB.

Trop. Amer.

Stem 3-6 ft., slender above, stout branched creeping and rooting below. Leaves 5-8 by  $\frac{1}{2}$ -1 in., finely acuminate, narrowed to the very narrow base, thun, flaccid, softly hairy on both surfaces; sheath with hispidly ciliate margins towards the contracted mouth; ligule obscure. Panicle 3-5 in., ovate-oblong, branches 1-1 $\frac{1}{2}$  in. Spikelets  $\frac{1}{10}$  in, subsessile, green.—This grass is described as annual by Grisebach, and as perennal by other authors.

49. **P. rhachitrichum**, Hochst. in Flora, xxvii. (1844) 254; annual, nodes of stem pubescent, leaves plicate, panicle subpyramidal, branches slender spreading and pedicels laxly hairy, gl. I minute membranous, II and III subequal ovate-oblong obtuse, III paleate neuter, IV ellipsoid rugulose tip rounded. Parlat. in Hook. Niger Flora, 187; Steud. Syn. Gram. 63. P. chamaeraphis, Nees ex A. Braun, Ind. Sem. Hort. Berol. (1853), App. 20; Anderss. in Walp. Ann vi. 947. P. homonymum, Steud. l. c. 48; Duthie Grass, N.W. Ind. 4 (homogynum).

SUBTROPICAL HIMALAYA; Dehra Dhun, Royle; Chamba, alt. 5000 ft., Clarke; Kumaon, Duthie; Sikkim, alt. 6000 ft. Chota Nagrue and Calcutta, Clarke. DISTRIB. Africa trop.

Stems tufted, erect, 8-18 in., leafy. Leaves 6-8 by 1-1½ in., flaccid, glabrous or sparsely hairy, base rounded; margins and mouth of sheath villous. Panicle 2-6 in., branches alternate spreading; rachs very slender, flexuous, bristle of pedicel twice as long as the spikelet. Spikelets ½ in., secund, 1-2-seriate, loosely or densely imbricate, sometimes fascicled in the Calcutta specimens, dorsally compressed; gls. membranous, pale, nerves green; I 1-3-nerved; II 5-6-nerved, obtuse; III 5-nerved, palea minute.

# Sect. VIII. GIBBOSÆ. (See p. 25.)

- \* Spikelets usually shortly pedicelled.
- 50. **P. trigonum,** Retz. Ols. iii. 9 (excl. Syn. Burm); leaves 1-2 in., panicle contracted, branches short, spikelets  $\frac{1}{6}$  in. very shortly pedicelled

hispidulous, gl. I = about ½ III obtuse or acute 3-nerved, III 5-nerved. Kunth Enum. Pl. i. 116; Nees Agrost. Bras. 206; Roxb. Fl. Ind. i. 305; Thw. Enum. Pl. Zeyl 359 (m part); Trim. Cat. Ceyl. Pl. 205. P. difforme, Roth Nov. Sp. 52. P. gibbum, Steud. l. c. 87. P. radicans, Buhse in Mig. Pl. Jungh. 375; Mig. Fl. Ind. Bat. iii. 453 (non Retz). P. repens and Burmanni, Heyne ex Herb. Wight. Aira repens, Hb. Heyne ex Wall. Cat. n. 8743 A.—Panicum, Wall. Cat. 8743 A.C.

Lower Bengal, Wallich. The DECCAN PENINSULA, Heyne, &c. CEYLON,

Walker, &c., Thwaites (C.P. n. 888).—DISTRIB. Java.

Perennial. Stem as thick as packthread, decumbent branching and interlaced below; branches erect. Leaves linear-lanceolate, glabrous or laxly hairy; sheath glabrous or margin ciliate; ligule rounded. Panule 1-1; in., rachis and short suberect branches glabrous; gl. I-III pale brown; tip of IV naked or bearded.

51. **P. pilipes,** Nees & Arn. ex Bise in Miq. Pl. Jungh. iii. 376; tall, leaves 2-6 in, paniele contracted, branches short with often slender harrs on the pedicels, spikelets  $\frac{1}{16}$  in. very shortly pedicelled glabrous, gl. I = about  $\frac{1}{2}$  III obtuse 3-nerved, III 5-nerved. Wight Cat. n. 2343; Miq. Fl. Ind Bat. iii. 453; Trim. Cat. Ceyl. Pl. 105 P. hermaphroditum, Steud. Syn. Gram. 67; Benth Fl. Austral. vii. 485. P. oxyphyllun, Hochst. ex Steud. l. c. 65. P. carinatum, Presl Rel. Haenk. i. 309 (ex Hack. in Engl. Bot. Jahrb. vi. (1885) 235).—Panicum, Wall. Cat. n. 8748 B. D.

Sikkim Terai, Clarke. Khasia Hills, alt. 0-2500 ft., common. Burma, Central Provinces, Nilghiri Hills, alt. 4000 ft., the Malay Peninsula, Nicobar Islds. and Ceylon (C P 100, 709, 891).—Distrib. Tonkin, Mulaya,

Australia, Pacific Islds., Mascarene Islds and Madagascar.

Perennial. Stem 1-2 ft., geniculately ascending from a slender creeping branching base, lower nodes rooting, upper subpulsesent. Leaves \(\frac{1}{2}\)-1\(\frac{1}{2}\) in. diam., glabrous or sparsely hairy above, puberulous beneath, finely acuminate, base narrow; sheath glabrous or ciliate, mouth hairy; ligule rounded. Panicle 3-5 in.; branches rather remote, elect or spreading with short fastigiate branchlets; spikelets brown; gl. IV white, its palea narrow, patent, hard.—The Madagascar and Seychelle Islds. P. multinode, Lamk, is very closely allied, if not the same, in which case that name takes priority. In Nicobar specimens the spikelets are sparsely pubescent. Thwaites regarded pilipes as a form of P. trigonium.

\*\* Pedicels capillary, much longer than the spikelets.

52. **P. patens,** Linn. Sp. Pl. 86; stem creeping and rooting below, leaves ovate to linear-lanceolate glabrous or ciliated below with tuberclebased hairs, panicle contracted or effuse, rachis branches and pedicels capillary, gl.  $\hat{\mathbf{I}} = \frac{1}{3} - \frac{2}{3}$  III ovate obtuse 3-nerved, II and III glabrous or with ciliate tips. Burm. Fl. Ind. t. 10, f. 2, Spreng. Syst. i. 322 (excl. syn. multinode); Kunth Enum. Pl. i. 126 (excl. syn. Roxb.). P. accrescens, Trin. Sp. Gram. Ic. t 88, & corrigend. vol. iii; Kunth l.c.116. P. obliquum, Roth Nov. Sp. 51; Kunth l.c. 103; Miq. Fl. Ind. Bat. iii. 452. P. radicans, Retz. Obs. iv. 18; ? Trin. Pan. Gen. 218; Nees Agrost. Bras. 206; Kunth l.c. 216; Wight Cat. n. 2344. P. trigonum, in part, Thw. Enum. Pl. Zeyl. 359. P. velutinum, Willd. Herb. ex Spreng. l. c.—Panicum, Wall. Cat. n. 8738, 8740.

Throughout India, from the Lower Himalaya in Garwhal to Sikkim, and the Khasia Hills, ascending to 3000 ft., southward to the Malayan Peninsula and Ceylon.—Distrib E. tropical Asia and the Malay and Pacific Islds.

Stem 1-3 ft., branched below, leafy; nodes glabrous. Leaves 2-6 by 1-3 in.,

thin, finely acuminate; margins and mouth of sheath ciliate; ligule rounded. Panicle 2-5 in., usually inclined with spreading glabrous or puberulous branches naked below, and very long distant spreading branchlets. Spikelets 16 in. long .- Very variable in the size of the whole plant and of its leaves and panicle. The smaller forms agree with the specimens of P. patens in the Linnean Herbarium, and are Wall:ch's n 8740, and n. 8738 C.; the larger are P. accrescens of Timus (referred by himself to obliquim, Roth.), and are Wellich's 8738 A. B. D. A small variety? with larger spikelets, nearly 1/12 in. long, occurs in the Nilghins (Herb. Wight n. 3047); at Goodavery Gnats, Lawson; and in Ceylon, at Newera Elia (C.P. n. 886).

53. P. longipes, Wight et Arn. in Wight Cat. n. 1638; tall, leaves 4-10 in., panicle 5-10 in. fastigiately supra-decompound, branches and long pedicels capillary, spikelets  $\frac{1}{12}$  in glabrons, gl. I nearly = III ovate acuminate 3-nerved, II and III acute. Aira capillaris, Heyne in Herb. Rottler, & in Wall. Cat. - Panicum, Wall. Cat. n 8741.

NILGHIRI and PULNEY HILLS, Heyne, &c.; Karkun Ghat, alt. 2000 ft., Lauson.

Stem 2-3 ft. and upwards, as thick as a crow-quill, quite smooth, base decumbent. Leaves \(\frac{1}{3}-\frac{2}{3}\) in. broad, finely acuminate, narrowed and sparsely hairy at the base, finely puberulous beneath; sheath nearly glabrous; ligule rounded. Panicle subfastigiately branched; branches simple sometimes naked below for an inch and more, then fastigiately branched. Spikelets pale brown; gl II and III with spaningly ciholate tips.—Distinguished from P. patens by the greater size, robuster habit, and much larger spikelets with acute glumes. What may be a small state of it was found at Golaghat, Seebsagur, by Clarke. Compare also the form of P. patens with larger spikelets.

54. P. sparsicomum, Nees ex Steud. Syn. Gram. 83; stem filiform diffusely branched, leaves  $1-2\frac{1}{2}$  in. sortly pubescent, panicle effuse of few long capillary branches and branchlets, spikelets 15 in. oblong glabrous, gl.  $I = \frac{1}{2}$  III faintly 3-nerved, II longest and III ovate-lanceolate acute 5-nerved, IV thin pale. Wight Cat. n. 1635 (name). Agrostis zeylanica? Herb. Wight.; Klein ex Steud. l. c. 83.

CEYLON; Cookle or Cocklaj, Jan. 23rd, 1796, Heyne in Herb. Rottl.

Stems 6-18 in., almost capillary, rooting at the nodes. Leaves 1-1 in. broad, acuminate, harry on both surfaces; sheaths and their mouths hairy. Panicle on a filiform peduncle, 3-4 in. long and broad. Spikelets few, distant; gl. IV not so strongly laterally compressed and gibbous as in its allies.—A very distinct species, I think, but not easily characterized.

# Sect. IX. Pseudechinolæna. (See p. 28.)

55. P. uncinatum, Raddi Agrost. Bras. 41; Trin. Gram. Panic. 174, Sp. Gram. Ic. t. 216; Kunih Enum. Pl. i 172; Steud. Syn. Gram. 60; Thw. Enum. Pl. Zeylan. 359; Trim. Cat. Ceyl. Pl. 105. P. echinatum, Willd. ex Doell in Mart. Fl. Bras. ii II, 193. P. glandulosum, Nees ex Trin. Gram. Panic. 174. P. heteranthum, Link Enum. Hort. Berol. i. 212. P. nemorosum β, Trin. l. c. 174. P. Trinii, Mor. Syst. Verz. Zoll. Echinolæna polystachya, H. B. & K. Nov. Gen. & Sp. i. 119, t. 679; Kunth l. c. i. 172, Suppl. 127. Cenchrus lappaceus, Herb. Heyne. P Lappago aliena, Spreng. Neue Entdeck. iii. 15.—Echinolæna, Wall. Cat. n. 8661.

EASTERN HIMALAYA; from Nepal to Sikkim, alt. 3-6000 ft. Khasia, Naga,

and MUNNEPORE HILLS, alt. 2-5000 ft. SOUTH DECCAN, on the Shivagerry Hills.

Wight. CEYLON, common - DISTRIB. Trop. Asia and America.

Perennial. Stem decumbent, straggling and branched below; branches 4-18 in., leafy, slender. Leaves 2-4 in., ovate-lanceolate, membranous, flat, base mariow oblique: sheath cliate: ligule oblong, scarious. Panicle 1-3 in.; branches 2-6, distant, spiciform, flexuous, scaberulous. Spikelets  $\frac{1}{8}$  in., solitary or 2-nate, dimidiate-ovate; pedicels very short, uncinete, scabrid; gl. I oblong-lanceolate, acqminate, keeled, 3-nerved, tip scabrid; II gibbously cymbitorm, acute, 7-nerved, pale dull red, hispid, hairs sometimes hooked; III broadly ovate, obtuse, 7-nerved, paleate, male, green, sides cent e and obtuse tip broadly hyaline, lateral nerves approximate: IV cymbiform, shorter than III, laterally compressed, thinly coriaceous. Lodicules 0.

#### DOUBTFUL AND EXCLUDED SPECIES.

P. ABLUDENS, Roem. & Schult. Syst. ii. 457; Roth Nov. Sp. 53. P. ramosum, Heyne mss. ex Roth l c. P. paradoxum, Rottl. mss. ex Roem. & Sch. l. c., is evidently a Paspalum.

P. ACIOULARE, Desv. in Poir. Encycl. Suppl. ii. 274; Nees Agrost Bras 235; Kunth Enum. Pl. i. 116; Steud. Syn. Gram. 82, is, I suspect, an American species, erroneously described as E. Indian. There is no Indian Panicum at all answering to it.

P. ANGUSTATUM, Edgew. in Journ. Beng. As. Soc. xxi. (1852) 157; name only.

P. ARANKOSUM, Edgew. in Index Kewensis, is an error for Pennisetun araneosum, Edgew. (= Penn. lanugiposum).

P. CONCINNUM, Edgew. l. c. 157, 179, 187; the description will apply to various

species.

P. FESTUCOIDES, Poir. Encycl. Suppl. iv. 283; Kunth Enum. Pl. i. 131 is undeterminable.

P. FLEXUOSUM, Retz. Obs. iii. 9, and iv. 16; Steud. Syn. Gram. 83, described as an Indian Plant of Koenig's by Retz., is doubtfully referred to the Brasilian Isachne ventracosa by Doell in Mart. Fl. Bras. ii. II, 274. Retz describes it as being like

capillare, Linn., but with the nodes bearded by reflexed hairs.

P. FUGAX, Koen. in Naturf. xxui. (1788) 209; Gmel. Syst. 162; Kunth l.c. 134, is undeterminable -Mr. Rendle informs me that this probably refers to a plant alluded to by Koenig in his correspondence (now in the British Museum) as "a decumbent Panicum growing in rice-fields, in which the panicle flowered almost before it had left the sheath, often a larva is found in the flower when the latter perishes otherwise it is caducous." A diseased Panicum (possibly P. psilopodium) bearing the name P. unsectiferum, Koen. mss. in Herb. Mus. Brit. is presumably the plant.—I find diseased spikelets to be frequent in P. psilopodium.

P. HEYNII, Roth Nov. Sp. 49; Kunth l. c. 130; Steud. l. c. 80; branches of oblong panicle struct divided, base hairy, lowest whorled with fascicled flexuous scabild branchlets, pedicels solitary alternate, gl. I cordate obtuse embracing the

spikelet, leaves shaiply serrate, margins and mouth of sheath hairy. P. INFIDUM, Steud. Syn. Gram. 63, is probably a Paspalum.

P. Kunthii, Steud. Nom. Ed. 11, ii. 258. P. orthum, Voigt Hort. Suburb. Calcutt. 701; P. Pseudostricta, Steud. Syn. Gram. 39; Digitaria stricta, Roth Nov. Sp. 38; Setaria? stricta, Kunth Revis. Gram. i. 47, Enum. Pl. i. 157. I

have failed to identify this plant. It is possibly a Paspalum.

P. EEPENS, Roxb. Ic. med. t. 111, 112, 796. Three plants of the section Brachiarsa thus named are in Roxburgh's collection of drawings, none of them answering to his description of repens in Fl. Ind. (which I take to be P. vestitum), nor to the P. repens, Linn. All are represented as perfectly glabrous, with stem 12-18 in. high, creeping below; leaves flat, 4-5 in., strict, narrowed from a rounded base to the top; panicle 4-6 in.; spikes 10-20, 1-1; in.; spikelets subsessile, about ; in., close set, sometimes obscurely paired, green; gl. I 1 1 III, 5-nerved. In t. 111 the spikes are about 10, distichously spreading. In t. 112 there are about 20 distichously spreading spikes. In t. 796 there are 10, all secund. The grain of t. 111 is ovate-lanceolate, acummate, with three dorsal lines; of t. 212 ovate-lanceolate, acummate; of t. 756 elliptic-oblong, acute.-It is evident that in this as in other cases, Royburgh had not named his Icones in accordance with the descriptions prepared for the "Flora Indica."

P. SERICEUM, Soland in Ait. Hort. Kew, 88, is a West Indian plant erroneously

entered as from "Ind. Or." by Steudel.

P. SIMPLICISSIMUM, Koen. in Neue Schrift. Naturf. xxiii. (1788) 209 (ex Index Kewensis). There is no such species described in the work cited, but Mr. Rendle has pointed out to me that at the bottom of the page Koenig mentions a very fine grass sent by him to Dr. Solander, adding, "Er hat eine Paniculam simpli-

P. TENUE, Roxb. Fl. Ind. i. 310; stem 1-6 ft. erect, ramous, panicle thin, spikelets binate on a common hairy pedicel with unequal partial pedicels, gl. III paleate, grain ovate transversely waved .- Wild in the Circar Mts. (Roxb.).-Stem sometimes prostrate and rooting. Leaves large, upper surface hairy, margins with very sharp points; sheaths shorter than the internodes, hairy, mouths bearded. Panicle erect, till fruiting, then bowing as in P. miliaceum, of alternate compound nearly secund racemes; rachis 4-5-angled, branchlets 3-angled, flexuous hairy. Spikelets smooth, gls. many-nerved, III male in luvuriant plants —I have altered Roxburgh's phraseology to bring it into harmony with that of this work. I have seen no plant answering to the above description except perhaps a small state of P. maximum.

P. TRACHYPUS, Trin. Panic. Gen. 170; 1ays subracemitorm, shortly compound from the base alternate, raylets spreading, pedicels very short, spikelets lineal obovate submuctonulate pubescent, gl. I 3-4 times shorter than the spikelet, 3-nerved, II 5-nerved, 4 mucronate rugose. Leaves glabrous lanceolate from a cordate base.—

Nepal.

P TRIFLORUM, Edgew. in Journ. As. Soc Beng. xxi. (1853), 157, 179; Duthie Grass. N W. Ind. 7, Fodd. Grass. N. Ind. 13, Edgeworth's description will apply to various species.

### 5. ICHNANTHUS, Swartz.

Annual or perennial branching grasses. Leaves broad. Spikelets 1-2-fld, long panicled, ovate or lanceolate, terete, articulate (but often persistent) on their pedicels. Glumes 4, I li and III subequal or II longest, strongly nerved; III paleate or not, male or neuter; IV much shortest, stipitate, paleate, bisexual, oblong or oblong-lanceolate, stipes with an anticous simple or 2-fid or 2 lateral appendages. Lodicules 2, minute. Styles free, exserted apically. Stamens 3. Grain coriaceous, acute or acuminate, polished, articulate at the base of the stipes.—Species about 20, tropical.

This genus differs from Panicum in the appendaged base of gl. IV.

1. I. pallens, Munro in Benth. Fl. Hongk. 414; stem slender elongate, leaves broadly lanceolate, panicle open, rachis and subsecund branches slender, gls. spreading, I ovate-lanceolate acuminate, III paleate neuter or male, IV when mature exposed, turned on one side, oblong obtuse, appendages 2 adnate to its sides. Thw. Enum. Pl. Zeyl. 361; Trim. Cat. Ceyl. Pl. 105. Panicum pallens, Swartz Prodr. 23, Fl. Ind. Occ. i. 164; Kunth Enum. Pl. i. 89; Nees Agrost. Bras. 137; Trin. Sp. Gram Ic. t. 211; Griseb. Fl. Brit. W. Ind. 550. P. vicinum, Baily Syn. Queensland Fl. iii. 82. Apluda Zeygites. Aubl. Pl. Guian. ii. 933 (excl. Syn.). Pagrostis nutans, Poir. Encycl. Suppl. i. 255.

SIKKIM HIMALAYA; ascending to 3500 ft. KHASIA HILLS, alt. 1-4000 ft.,

Assam, and Bengal -Ceylon, alt. 4000 ft -Distrib. Tropics generally.

Stem 1-2 ft., weak. d-cumbent; loosely branched, more or less pubescent. Leares 3-6 by \( \frac{1}{2} - 1 \) in., broadly-lanceolate, thin, flat, caudate-acuminate, scaberulous; base rounded or cordate, cliate; sheath lax; ligule a few hairs. Panicle 3-4 in., unilateral; branches erect or spreading, and pedicels scaberulous. Spikelets \( \frac{1}{2} \) in. long, green; gl. I-III persistent, keels scabrid; I more than \( \frac{1}{2} \) III, ovate-lanceolate, subaristate, 3-nerved, II acuminate 5-nerved; III obtuse 5-nerved, palea large; IV = \( \frac{1}{2} \) III deciduous, smooth, pale, turned half round so that the long diam. is at right angles to the plane of the spikelets; appendages obscure.—The oblique position of the grain is very peculiar.

2. **I.** foliolosus, Munro in Herb. Kew; dwarf, hispidly hairy, fastigiately branched from the base, leaves short almost subulate, spikelets  $\frac{1}{2}$  in in short panicles half immersed in the leafy tips of the short branches erect, gl. I nearly = III 5-nerved, II longer than III subaristate, III epaleate 5-nerved, IV ellipsoid acute, appendage minute anticous 2 lobed. Panicum foliolosum, Wall. Cat. n. 3680.

BURMA; Ava, Wallich; Mengoon, J. Ander on.

Densely tutted, 6-8 in. high, stiff, branches suberect or prostrate to the tips. Leaves  $1-\frac{1}{4}$  by  $\frac{1}{10}-\frac{1}{6}$  in, flat, strongly many-nerved, clothed like the short sheaths and panicles with spieading hairs; ligule of rigid hairs. Panicles with short erect angular branches. Spikelets green, tips scabrid; gl. IV much shorter than III, stipitate, base truncate.—A very peculiar species.

#### 6. THYSANOLAENA, Nees.

A very large glabrous grass; stem solid. Leaves broad, flat. Panicle very large, effuse, with myriads of crowded long filtform compound suberect branches and branchlets bearing innumerable subsecund very minute 1-fld. spikelets which are jointed on very short pedicels. Glumes 4; I and II minute, concave, obtuse, awnless; I shortest nerveless, 1r nerveless; III much longer, epaleate, empty, coriaceous, acuminate, 1-nerved, hardening; IV rather shorter membranous, oblong, acute, clothed with white erect hairs, palea short, truncate. Stamens 2-3, anthers short. Styles free. Grain most minute, free within the hardened glumes.

T. Agrostis, Nees in Edinb. new Phil. Journ. xviii (1835) 180; Steud. Syn. Gram. 119. T. maxima, Herb O. Kuntze. T. acarifera, Arn. & Nees in Nov. Act. Nat. Cur. xix. Suppl. i. (1843) 181; Wall Cat n. 8882, Lisboa in Journ. Bomb. Nat. Hist. Soc. v. (1890) 347; Duthie Grass N. W. Ind. 13, Fodd. Grass. N. Ind. 21. Panicum acariferum, Trin. Sp. Gram. Ic. t. 87; Baker Fl. Mawrit. 437; Mig. Fl. Ind. Bat. in. 517. P. Amlisa, Herb. Ham. ex Wall. l. c. C. Myriachaeta arundinacea, Zoll. & Mor. Syst. Verz. Zoll. 101; Steud. Syn. Gram. 404. M. glauca, Mor. ex Steud. l. c. 404; Zoll. Syst. l. c. Melica latitolia, Roxb. Fl. Ind. i. 328. Agrostis maxima, Roxb. l. c. 317. A. latifolia, Heyne in Herb. Rottl. (non Trevir.). A. scoparia, Koenig ex Herb. Rottl. (non Steud.). Arundo montana, Herb. Ham. ex Wall. l. c. B.

SUBTROPICAL HIMALAYA, from Kumaon eastwards and the Khasia Hills, alt. 4-5000 ft. Behar; on Parus-nath. The Deccan, Burma; Nicobar Islls., and Penang.—Distrib. Eastw. to New Guinea.

Stem 4-12 ft., sometimes as thick as the little finger. Leaves 1-2 ft. by 2-4 in., coriaceous, tapering to a fine point, base cordate; mouth of sheaths hairy; ligule

short, ciliate. Panicle 1-2 ft., soft, quite glabrous. Spikelets  $\frac{1}{20}$  in., pale yellow, rather shining, very obscurely jointed on the pedicels which are jointed on the branches.—Myriachaeta glauca, Mor., was founded on the erroneous supposition that its gl. IV was harless. The spikelets are sometimes viviparous.

## 7. CHAMAERAPHIS, Br.

Glabrous marsh or aquatic grasses. Leaves linear or lauceolate. Spikelets 1-2-fld., subsessile and subsecund on the branches of a simple panicle which are produced in an awn-like bristle beyond the terminal spikelet, obscurely articulate on their pedicels, narrowly lanceolate. Glumes 4, I very small, truncate, hyaline, nerveless; II longest, acuminate or narrowed into rigid awn, 5-many-nerved; III lanceolate acute or aristately acuminate paleate male or neuter; IV very small, oblong, hyaline, fem. or bisexual; palea hyaline. Lodicules of male fl. cuneiform Stamens 3. Styles free. Grain linear-oblong, compressed, free within the gl.—Species 5-6, trop. As and Austral.

Besides the spikelets on the branches of the panicle, there are often one or more on the peduncle below the panicle, which are appressed, and sometimes somewhat sunk in a groove of the peduncle. The species are very variable.

1. C. spinescens, Poir Encycl. ii. 189; stems elongate rather stout, panicle pyramidal or contracted, branches with one few or many spikelets each 1-1 in., glume III aristately acuminate many-nerved, IV obtuse. Brith. Fl. Austral. vii. 499; Trim. Cat Ceyl. Pl. 106. C. aspera, Nees in Wall. Cat. n. 8679; Wight Cat. n. 1655; C. paradoxa, Poir. l.c., Kunth Enum. Pl. i. 148, Suppl. 105. C. spinosa, Beauv. ex Schult. Mant. ii. 253. Panicum asperum, Koen. in Naturf. xxii. (1788) 209; Wight ex Steud. Sym. Gram. 49; Thwaites Enum. Pl. Zeyl. 4 6. P. spinescens, Br Prodr. 193; Kunth Enum Pl. 1. 131. P. ischæmoides, Heyne ex Wall. l.c. P. squarrosum, Lam. Encycl. iv. 743; Kunth Enum. Pl. i. 131. Andropogon squarrosus, Linn. Herb. Echinochloe squarrosa, Roem. & Sch. Syst. ii. 479. Orthopogon squarrosus, Spreng. Syst. i. 307. Setaria longiflora, Desv. Opusc. 81.

MARWAE; ON Mt. Aboo, King. BANDA, Duthie. LOWER BENGAL, Roxburgh, Griffith, &c. South Deccan Peninsula, Heyne, Wight, &c. Crylon, Ferguson Glenne.—Disteib. China, Malaya, Australia.

Floating in much branched masses, with leafy stems 1-3 ft., and panicles 2-4 in. long, varying very much in the number and size of their spikelets. Leaves 1-3 in., and their somewhat inflated sheaths smooth or scabellulous. Spikelets \( \frac{1}{6} - \frac{1}{4} \) in long.

Var. Brunoniana; spikelets one or two on the branches of the paintle \(\frac{1}{4-\frac{1}{2}}\) in. long. Paneum Brunonianum, Griff Ic. Pl. Asiat. t. 145 and 139, f. 107. P. (Chamaeraphis) intermedium, and P-eudoraphis Brunoniana, Griff. Notul iv. 29. Holcus natans, Herb. Roxb.—Lower Bengal, Roxburgh, Griffith.—Tonkin, Australia.

Var. depauperata; slender, leaves very short, panicle short contracted, spikelets in. C. depauperata, Nees in Wight Cat. n. 1654; Steud. Syn. Gram. 49; Trim. Cat. Ceyl. Pl. 106. Panicum sordidum, Thw. Enum. Pl. Zeyl. 443.—Jheels of Bengal, the Deccan and Ceylon.

2. **C. gracilis,** Hack. in Engl. Bot. Jahrb. vi. 326; branches of panicle many simple with many minute spikelets  $\frac{1}{10}$  in. long.

LOWER BENGAL; Clarke. CACHAR, Keenan. BUEMA, Kurz.-DISTRIB.

Stems 6-8 in., decumbent and rooting at the nodes, geniculately ascending,

branches slender; internodes 1-2 in. Leaves 1-1½ by ½-½ in., spreading, strict, linear, acute, striate, base rounded, glabrous or sparsely hairy; sheaths broad, loose, membranous, compressed, 2-auricled, glabrous; ligule short, hyaline, toothed. Pansele shortly exserted beyond the upper sheath, 1-2 in. long, rachis and erectopatent subsimple branches capillary, smooth. Spikelets very shortly pedicelled, gre n or brownish; gl. I truncate; II straight, sometimes long-acuminate or almost beaked, glabrous or obscurely sparsely hairy, nerves close, strong; III ½-½ shorter than II, subacute; IV about ½ III.—Very near the Australian C. abortwa, Poir. (C. spinescens var. parvispicula, Benth.) which has a lax panicle with few branches and spikelets.

#### 8. SPINIFEX, Linn.

Stout, rigid, bushy, polygamo-diceious grasses. Leaves long, rigid, involute. Male spikelets 2-fld., subsessile, articulate on rigid peduncled spikes, which are collected in umbels surrounded by spathaceous leafy bracts; glumes 4, membranous, not awned; I and II empty; III and IV paleate, triandrous. Fem. spikelets collected in large globose heads of stellately spreading very long rigid rod-like rachides, surrounded by shorter subulate bracts; each spikelet solitary, and articulate at the very base of a rachis, lanceolate, 2-fld. Glumes I, II, III, as in the male, but larger; III paleate, empty or triandrous; IV fem. Lodicules 2, large, nerved. Styles long, free; stigmas shortly feathery. Grain free within the hardened glumes.—Species 4; an Indian and 3 Australasian.

S. squarrosus, Linn. Mant. ii. 300; glabrous, glaucous, leaves pungent, male spikes 2-3 in., spikelets distant, fem. spikelets concealed by the bracts. Lamk. Illust. t. 840; Kunth Enum. Pl. i. 175; Wall. Cat. n. 8631; Steud Syn. Gram. 113; Thw. Enum. Pl. Zeyl. 362; Trim. Cat. Ceyl. Pl. 106; Elliott Fl. Adrh. 163; Lisboa in Journ. Bomb Nat. Hist. Soc. v. (1890) 339; Duthie Grass. N.W. Ind. 11; Benth. Fl. Hongk. 415; Miq. Fl. Ind. Bat iii. 474. S. dioicus, Ham. ex Pritz. Icon. Index, 1058. Stipa littorea, Burm. f. Fl. Ind. 29. S. spinitex, Linn. Mant. i. 84.—Rheede Hort. Mal. xii. t. 75.

Sandy coasts of both Peninsulas, Buema, and Ceplon.—Distrib. Java, China. A squarrose gregarious bush, several feet high and broad. Leaves 4-6 in; sheaths often imbricating; ligule very short, hirsute. Peduacles of male 2-3 in; scaberulous, tips naked, pungent. Male spikelets \(\frac{1}{2}\)-\frac{1}{2}\] in; gls. thin, all glabrous, I and II subequal, oblong lunceolate, acuminate, 7-9-nerved, nerves scaberulous; III rather longer, 5-nerved, paleate; IV shorter, ovate-lanceolate, acuminate, 5-nerved; paleas of III. and IV. narrowly lanceolate, keels ciliate. Fem. spikelets \(\frac{1}{3}\) in., narrowly lanceolate, acuminate, 5-inerved, nerves scaberulous; II rather shorter, acute, 7-nerved; III like II, 5-nerved; IV ovate-lunceolate, abruptly narrowed above the middle and acuminate, 5-nerved; palea shorter but broader than the gl., acute, 2-nerved, keels smooth, style very long, branches slender.

# 9. AXONOPUS, Beauv.

Perennial grasses. Spikelets 2-fid., articulate with the pedicel, sessile or subsessile in whorled or digitate spikes, awned. Glumes 4, I shortest, ovate, acuminate or cuspidate, glabrous, 3-nerved; II ovate-lanceolate, acuminate or awned, 5-nerved, lateral nerves marginal villous; III oblong, acute. 5-nerved, paleate, male, palea very short 2-fid or 2-partite; IV = II,

oblong or ovate, coriaceous, narrowed into a straight subulate awn; palea oblong, coriaceous, 2-nerved. Lodicules cuneate. Stamens 3, anthers long. Styles distinct. Grain small, suburbicular, free within the glumes.

A natural genus, remarkable for the small cleft palea of gl. III. It was established by Beauvois on Panicum cimicinum, Retz, to which other grasses having no affinity with it were added. Kunth erred in taking up Beauvois Urochloa (which is Panicum javanicum, Poir) and placing A. cimicinum in it.

1. A. cimicinus, Beauv. Agrost. 12; leaves ovate or ovate-lanceolate, spikes subverticillate. Panicum cimicinum, Retz. Obs. iii. 9; Rottl. in Neue Schrift. Ges. Naturf Freund. iv. (1803) 191, 194, Roxb. Fl. Ind 1. 295; Thv. Enum. Pl. Zeyl. 358; Trim. Cat. Ceyl. Pl 104. P. conjugatum, Dalz. & Gibs. Bomb. Fl. 291. Urochloa cimicina, Kunth Revis. Gram. i. 31, ii. 56, t. 103, Enum. Pl. i. 74, Suppl 56; Dalz. & Gibs. Bomb. Fl. 289. Cordochloa cimicina, Nees in Edinb. N. Phil. Journ. xv. (1833) 381. C. fimbriata, Nees ev Wight Cat. 1656; Wall. Cat n. 8749; Arichis. Cat. Panjab Pl. 158. Milium cimicinum, Linn. Mant. 184.

Throughout India, in the plains and lower hills, BURMA, PENANG and CEYLON.

-DISTRIB. Malaya, China.

Stem 1-2 ft, tufted, stout or slender, erect, or decumbent and geniculate at the base, and leaves hirsute with long spreading white hairs, rarely glabrescent. Leaves 1-3 by  $\frac{1}{2}$ -1 in, acute or obtuse, flat, green, striate, ciliate, base deeply cordate, ligule obsolete. Spikes 3-8 in a whorl, 1-6 in, long; rachis filiform, simple of wivided, scaberulous; flowerless below. Spikelets  $\frac{1}{3}$ - $\frac{1}{6}$  in, long, solitary or clustered, very shortly pedicelled, dorsally compressed, pale, rather shuning; gl. I acuminate; II mucronate or shortly awned; III acute; IV with a setiform awn.

2. A. semi-alatus, Hook. f.; leaves long linear, spikes few subdigitate. Panicum semi-alatum, Br. Prodr. i. 192; Benth Fl. Austral. vii. 472; Thw. Enum. Pl. Zeyl. 358; Trum Cat. Ceyl Pl. 104. P. viaticum, Griff. Ic. Pl. Asiat. t. 145, f. 2. Bluffia Eckloniana, Nees in Lindl Introd. Nat. Syst. Ed. II 447. Coridochloa semi-alata, Nees in Edinb New Phil. Journ. xv. (1833) 381. Urochloa semi-alata, Kunth Revis. Gram. i. 311, Enum. Pl. i. 74. Oplismenus semi-alatus, Desv. Opusc. 81. Arundinella Schultzii, Benth. l. c. 545. Aira viatica, Graff. Notul. iii. 54. Holosetum philippinense, Steud. l. c.—Coridochloa, Wall. Cat. n. 8758.

Subtropical Himalaya, alt. 4-6500 ft., from Kumaon to Sikkim. The Khasia Hills, alt. 4-5000 ft.; Munnepore; Burma, Collet; Behar on Paiusnath 3-5000 ft. Ceylon up to 5000 ft.—Distrib. Mauritius, S Africa,

China, Philippines, Australia.

Stems 1-3 ft., densely tufted, bases thickly clothed with the woolly remains of old leaf-sheaths. Leaves 8-12 by ½-½ in, glabrous or pubescent, finely acuminate; ligule obscure. Spikes 2-5, 3-6 in. long; rachis slender subflexuous, smooth or harry. Spikelets ‡ in., pale or brown, solitary or in distant pairs, sessile or pedicelled.

### 10. TRICHOLÆNA, Schrad.

Erect, tufted, annual or perennial grasses. Leaves narrow. Spikelets 1-2 fld., articulate on their pedicels, panicled, laterally compressed, clothed with long silky hairs, callus stipitiform. Glumes 3 or 4, I if present very small, often inserted much below III; II and III subequal, membranous, broadly ovate, mucronate or awned, dorsally rounded; III paleate, triandrous; IV very thin, shining, fem. or bisexual. Lodicules?, minute, dolabriform. Grain loose within the gls.—Species many, chiefly S. African.

A genus the characters of which cannot be satisfactorily determined till a great many indetermined species are examined. It differs from Panicum in the villous or silky awned spikelets with membranous glumes. The two Indian species differ remarkably in the form of gl. IV.

1. T. Teneriffæ, Parlat. in Webb & Berth. Phyt. Canar. iii. 425. Fl. Ital. i. 130, perennial, gl. I minute or obsolete, IV sessile ovate-lanceolate acuminate margins incurved. T. micrantha, Schrad. in Sch. Mant. ii. 163; Nees in Ann. Sc. Nat. Ser. II vi. (1836) 106. Panicum plumosum, Presl Fl. Sic. i 43. P. saccharoides, Trin. Grum Panic. 245 P. Teneriffæ, Br. Prodr. 189; Kunth Enum. Pl. 1. 98, Suppl. 75. P. villosum, Presl Gram & Cyp. Sic. 18. Saccharum Teneriffæ, Linn. f. Suppl. 106, Jacq f. Eclog. Gram. 51, t. 34 (excl. Syn.); Biv. Bern. Stirp. Sic. Rar. iv. 5, t. 1. Sibth. Fl. Græc. i. t. 53 (excl. Anal.). Agrostis plumosa, Ten Fl. Nap. Prodr. Suppl. 1. 59.

Western Panjab, Falconer; alt. 3500 ft., Stewart. Scind, Stocks.—Distrib. Westward to Sicily and N Africa.

Stems many from a woody stock, geniculate below, slender, rigid. Leaves very slender, convolute, rigid, glabrous; mouth of sheath bearded; ligule, a narrow membrane. Panicle 2-4 in. 1 ather open, branchlets and pedicels capillary. Spikelets  $r_0$ - $\frac{1}{0}$  in., white or purplish, silky with spreading hairs; gls II and III ovate acute or mucronate, concave; IV articulate at the base, white or brown, shining.

2. T. Wightii, Nees & Arn. ex Steud. Syn. Gram. 93; annual, gl. I very small linear, IV ellipsoid obtuse convolute. Nees in Wight Cat. n. 2345; Lisboa in Journ. Bomb. Nat. Hist. Soc. v. (1890) 347. T. micrantha, Schrad. in Sch. Mant. in 163; Schmidt Beitr. Fl. Cap Verd. 153. T. tuberculosa, Hack. mss. Rhynchelytrum Wighti, Duthie Fodd. Grass. N. Ind. 21. Panicum megalanthum, Steud. Syn. Gram 93. Saccharum Teneriffæ, Parl in Hook Niger Flora, 183 (ewcl. Syn.). Aira chinensis, Retz. Obs. iii. 10.—Tricholæna, Wall. Cat. n. 8660.

RAJPOOTANA; Ajmeer and Oodeypore, Duthie. The DECCAN, Heyne, Wight.—DISTRIB. Arabia, Cape Verd Islds.

Stems 6-18 in., fufted, stout or slender. Leaves 1-3 in., linear, acuminate, flat, and sheaths glabrous or harry; ligule obsolete. Panicle 2-4 in., very narrow; branches and pedicels capillary, flexuous. Spikelets very variable in size,  $\frac{1}{6}$  in. long; stipitiform callus gibbous, bearded; gl. I  $\frac{1}{12}$  in. linear-oblong, obtuse, concave spreading; II and III tunid below, subrostrate, awned below the acute or obtuse tip, nerves smooth or tubercled; awn very slender, not twisted, longer than the gl. or shorter, palea of III narrow, keels ciliate; IV very thin, margins often overlapping.—The great variability in the size of the spikelets is very deceptive. It is not known where in the Deccan Heyne's and Wight's specimens were collected.

#### 11. OPLISMENUS, Beauv.

Weak grasses; stems decumbent below, leafy. Leaves thin, flat, ovate to lanceolate; ligule a ridge of hairs. Spikelets 1-fld, sessile or subsessile, fascicled on a simple terminal spike or on panicled spikes. Glumes 4, I short, 3-nerved, long-awned, awn straight; II short, awn short or 0; III longest, 5-nerved, paleate or not, empty; IV lanceolate, terete and with its palea hardened. Stamens 3, anthers linear. Styles distinct. Grain free within the glumes.—Species few, very variable.

Of the 30 or more reputed species of Oplismenus, Burmannıı and compositus seem VOL. VII.

to be the most distinct, for undulatifolius, though constant over wide areas, is only a form of compositus with the branches of the panicle represented by one or a few sessile or subsessile spikelets.

1. O. undulatifolius, Beauv. Agrost. 54; spikelets solitary or clustered in a sumple terminal spike. Kunth Revis. Gram. i. 44, Enum. Pl. i. 139, Suppl. 101; Parlat Fl. Ital. i. 123; Boiss. Fl. Orient. v. 442; Franch. § Sav. Fl Japon. ii. 654; T. Nees Gen. Fl. Germ. Monoc. i. n. 28; Duthie Grass. N.W. Ind. 8. O. acuminatus, Nees ex Steud. Syn. Gram. 45. O. æmulas, flaccidus & imbecillis, Roem. & Sch. Syst. ii. 487. O. æmulus, Kunth Revis. i. 44. O. latifolius (error for undulatifolius) Herb. Strach. § Winterb.; Artchis. Cat. Panjab Pl. 161; Duthie l. c. 8. O. parvifolius, Kunth 45. O. setaiius, Roem. § Sch. l. c. Orthopogon gonyrrhizus, Miq. Fl. Ind. Bat. iii. 443; Orth. hirtellus, æmulus & flaccidus, Br. Prodr. 194. Orth. setarius, Spreng. Syst. veg. 306; Griseb. Fl. Brit. W. Ind. 545. Orth. undulatifolius, Spreng. Syst. i. 306; Reichb. Fl. Germ. Excurs. i. 23, Ir. Fl. Germ. i. t. 28. Orth. undulatus, Link Hort. Reg. Eerol. i. 203. Panicum barbifultum, Hochst. Pl. Hohenack. n. 1279, ex Schlecht. in Linnæa, xxxi. 307. P. Burmanni, Schrenk Pl. Ewsicc. Cent. iii. n. 68; Balb. Misc. Bot. 1. 8. P. gonyrrhizum, Steud. l. c. 44. P. hirtellum, All. Fl. Pedem. ii. 240. P. imbecille, Trin. l. c. t. 191; Wulf in Jocq. Collect. i. 263; Schrad. Fl. Germ. i. 242. P. setarium, Lamk. Ill. i. 170; Poir. Encycl. iv. 741; Pers. Syn. i. 82. P. undulatifolium, Arduin. Sp. Alt. 14, t. 4; Gaud. Agrost. Helvet. i. 28; Trin. Sp Gram. Ic. t. 192; Koch Syn. Fl. Germ. Ed. ii. 892. ? Setaria hirtella, Schult. Mant. ii. 276.

TEMPERATE HIMALAYA, alt. 6-9000 ft., from Kashmir to Sikkim. Khasia Hills, alt. 4-5000 ft., Nilghiri Hills.—Distrib. Central and S. Europe, warm

regions generally.

Stem 1-2 ft, usually very slender, simple or branched below. Leaves 1½-6 by ½-1 in., from ovate to narrow lanceolate, finely acuminate, glabrous or sparsely harry; sheaths glabrous or hirsute. Spike 2-5 in.; rachis glabrous or pilose with spreading hairs; lower clusters of spikelets rarely produced into a very short spike. Spikelets ½-½ in. (excl. awns), solitary with a second reduced to an awn, or clustered, glabrous or nearly so. Gl. I 3-nerved, ciliate; awn ½ in. or less; II usually awned, 5-nerved; III acute or shortly awned, 7-nerved, palea narrow or 0.—Though as observed under the genus, this grass is only a form of composities, it keeps its characters of the inflorescence throughout its distribution, and may hence be regarded as distinct. The Nilghiri form (acuminatus, Nees) has very narrow leaves, 3-4 by ½-½ in. It is remarkable that no specimen of this species should exist in the Wallichian Herbarium.

2. C. compositus, Beauv. Agrost. 54; stem usually tall from a decumbent base, leaves 2-7 in. lanceolate, spikes 4-10 1-6 in. long or more, spikelets usually loosely imbricate, awns rather stout pale or dark. Kunth Enum. Pl. i. 141; Trun. Sp. Gram. Ic. t. 188, 189, 190; Benth. Fl. Austral. vii. 491; Trim. Cat. Ceyl. Pl. 105; Aitchis. Cat. Punjab. Pl. 161; Duthie Grass. N. W. Ind. 81. O. brasilensis, Raddi Agrost. Bras. 40. O. bromoides, Baker in Journ. Linn. Soc. xxi. (1885) 452. O. Burmanni, Thw. Enum. 358; Hochst. Pl. Hohen. n. 368 (non Beauv.). O. decompositus, Nees in Endl. Prodr. Fl. Norfolk. 19 O. elatior & loliaceus, Beauv. l. c.; Kunth l. c. 142. O. hirtellus, Roem. & Sch. Syst. ii. 481. O. indicus, Willd. in Act. Acad. Nat. Cur iv. 224. O. Jacquini, Kunth Revis. Gram. i. 44, 45, Enum. i. 140, 146. O. lanceolatus, Kunth ll. cc. 45. 146; Wall. Cat. n. 8676; Dalz. & Gibs. Bomb. Fl. 292. O. latifolius, Hænke ex Steud. Nom.

Ed. II ii. 220. O. pratensis, Schult. Mant. ii. 597. O. sylvaticus, Roem. & Sch. l.c. 481; Kunth Revis. i. 44, Enum. i. 139, Suppl. 101. Orthopogon compositus, Br. Prodr. 194; Miq. Fl. Ind. Bat. iii. Orth. Junghuhnii, Nees ex Miq. l.c. 444. Orth. longeracemosus & sylvaticus, Miq. l.c. Orth. pratensis, & loliaceus, Spreng. Syst. i. 306. Orth. remotus, Trin. Fund. Agrost. 181. Panieum aristatum, Retz. Obs. v. 17. P. bidentatum & certificandum, Steud l.c. 44, 45. P. compositum, Linn. Sp. Pl. 57; Trin. Sp. Gram. Ic. t. 187; Steud. l.c. 44; Thw. Enum. Pl. Zeyl. 379; Benth. Fl. Hongk. 411; Baker Fl. Maurit. 439. P. composito-proximum, Rottl. Ges. Naturf. Fr. New Schrift. iv. (1804) 224. P. elatius, Linn. f. Suppl. 107. P. lanceolatum, Retz. Obs. v. 17, Roxb. Fl. Ind. 1. 294; Steud. l.c. 48. P. longeracemesum, Steud. l.c. 45. P. peninsulanum, Steud. l.c. 44. P. sylvaticum, Lamk. Encycl. iv. 733, Trin. Sp. Gram. Ic. t. 190 A.; Steud. l.c. 45. P. undatum. Steud. Nom. Ed. II. ii. 264. P. naguinosum, Herb. Banks ex Roxb Fl Ind. 1. 294. Echinochloa lanceolata, Roem. & Sch. l.c. 476. P. E. hurta, Schult. Mant. ii. 270. Hekaterosachne elatior, Steud. l.c. 118. Digitaria composita, Willd. Enum. Berol. i 91. Andropogon undatus, Jacq. Coll. iii. 237, t. 631.—Orthopogon sp. Griff. Notul. iii. 43.

Throughout India, from Kashmir to Upper Assam, Munnepore, and Burma (up to 8000 ft. in Sikkim) and southward to the Audaman and Nicobar Islds.,

Penang and CEYLON .- DISTRIB. most trop. regions (except Australia).

Stem 1-3 ft., stout or slender, branched from the base and sometimes upwards. Leaves very variable, 1\frac{1}{2}-1\frac{1}{2} in. broad; sheaths glabrous, pilose or hirsuite. Racemes 2-6 in., stout or slender; rachis glabrous, pilose or hispid; spikes \frac{1}{2}-3 in long, erect or spreading, green or purplish. Spikelets \frac{1}{2}-\frac{1}{2} in. (excl. awns) solitary or in rather distant pairs or fascicles, appressed to the rachis or spreading, glabrous or with few or many bristles longer than the glumes at the base, rarely softly hairy; gls. pale green or reddish purple, I short, 3-nerved, ciliate, awn \frac{1}{2} in to nearly \frac{3}{2} in., slender flexuous, pale yellowish or dark stouter and stiff; II longer or shorter than I, 5-7-nerved, acute, awn much shorter than of I or 0; III longer and broader than II; III acute or obtuse, 7-9-nerved, tip hispid, palea narrow or 0; IV lanceolate, terete, acuminate, and its hardened palea yellowish shining.—I am unable to group the Indian form of this most variable grass under practicable varieties. The following are indications of prevalent states, of which 6 is very aberrant.

1. Tall, stout, leaves 4-6 in., sheaths glabrous or hirsute, spikes and stout rachis of punicle more or less hirsute with long cilia, stout dark purplish awns often black. Wall. Cat. 8676 D. G. A. (left-hand specumen) Pan. elatius, Heyne & P. decompositus, Nees, in Herb Wight n. 222, 1651. Andropogon undatus, Jacq.—Sikkim,

Assam, Silhet, Burma and the Deccan.

2. Dwarf, branches short stout decumbent, leaves \(\frac{3}{4}\)-1 in. ovate green or purplish, sheaths hirsute, panicle erect, spikes erect stout glabrous or pubescent, and spikelets green or purple, awas short \(\frac{1}{6}\)-\(\frac{1}{6}\) in. stout.—Oudh forests, Assam, Chittagong.

3. Slender, leaves 2-3 in., ovate-lanceolute, sheaths hirsute, panicle long very slender drooping rachis and very slender spikes finely pubescent, spikelets distant

subsilky, awns very slender.—Sikkim alt. 1-3000 ft. Munnepore 4750 ft.

4. Tall, stout and much branched, or slender, leaves 4-7 in lanceolate, sheaths glabrous, spikes many long stout or slender erect or drooping, rarely dark-colrd, spikelets rather distant very many glabrous or sparingly setose at the base, awn stout or slender. O. lanceolatus, Kunth, Wall. Cat. 8676 A. B. C. H. L. O. compositus, Kunth, &c.—The commonest form.

5. Same as 4, but always slender, with glabrous sheaths and rachis of panicle, fewer very slender smooth spikes, with tew distant quite glabrous spikelets, awns slender pale. O. indicus, Wight Herb. n. 63, 1652 and lanceolatus, n 2332. O. lanceolatus, Wall Cat. 8676 E. F. M.—A reduced form of 4, and quite as

common.

- 6. Slender, diffusely branched below; spikes few, distant, very slender; spikelots few, silkily villous, pale green, gl. I 3-5-nerved; II 5-7-nerved; III 7-9-nerved, its palea narrow tip ciliate.—Of this there are three forms or varieties, a, stem 2 ft, rather stout, leaves 3-4 in. linear-lanceolate, spikes 2-3 in, awns  $\frac{1}{3}$  in.—Penang, Curtss, n. 1102.—b, Very slender, leaves 1-1 $\frac{1}{3}$  in., awns shorter. O. indicus, Wight Cat. n. 1652.—Ceylon, Thwastes (CP. 3963)—c. very slender, leaves  $\frac{1}{2}$ -1 in., spikes 2-3, short, gl. I as long as its awn.—Ceylon, Thwastes (CP. 3964).
- 3. O. Burmannii, Beauv. Agrost. 54; decumbent, flaccid, leaves 1-1 in., spikes 3-5 short, spikelets secund closely imbricate awns pale capillary. Roem. & Sch. Syst. ii. 484. Kunth Revis Gram. i 44, Enum. i. 139, Suppl. 101; Trin. Sp. Gram. Ir. t. 193; Dalz & Gibs. Bomb Fl. 291; N.E. Br. in Gard. Chron. (1886) 11. 776; Franch. & Sav. Enum. Pl. Jap. ii. 160; Wight Cat. n. 1650; Duthie Grass, N.W. Ind. 8, Indig. Fodd Grass. t. 47, Fodd. Grass. N. Ind 13. O. africanus, Beauv. Fl. Owar. n. 15, t. 68, f. 1; Kunth Enum. i. 141. O. albus, Roem. & Sch. Syst. ii 890. O. brasıliensis, Raddi Agrost. Bras. 400. O. bromoides, Beauv. Agrost. 54; Bojer Hort. Maurit. 366. O. Humboldtianus, Nees Agrost Bras. 264; Presl Rel. Hænk. i. 322. PO. indicus, Roem. & Sch. l.c. 484; Duthie Grass N W. Ind. 8. Orthopogon Burmanni, Br. Prodr. 194; Miq. Fl. Ind. Bat. in. 442; Reichb. Ic. Fl Germ. i. t. 28. Orth. albus, Nees ex Steud. l.c. 44, Miq. l c. Panicum Burmanni, Retz. Obs. iii. 10; Roxb. Fl. Ind. i. 298, Trin. Sp. Gram. Ic. t. 193; Baker Fl. Maurit. 438. P. album & africanum, Poir. Encycl Suppl iv 274, 275. P. bromoides, Lamk. Ill. i. 170, Encycl. iv. 742. P. hirtellum, Burm. Fl. Ind. 24, t. 13, f. 1 (non Linn); Steud. l.c. 44 P. japonicum, Steud. in Flora xxix. (1846) 18. P. multisetum, Hochst Pl. Schimp Abyss. n 1469; A Rich. Tent Fl. Abyss. ii. 377. Echinochloa hirtella, Schult. Mant. ii. 269.—Oplismenus, Wall. Cat. 8677, 8678.

PLAINS OF INDIA, from Rohilkund to Bengal, Silhet and Chittagong, ascending the Himalaya in Sikkim to 5000 ft. Behar and Central India, Ceylon, Jaffna (Herb. Rottl.); Ferguson.—DISTRIB. Malay Islds., China, Japan, Afr. trop.

Diffusely branched and rooting below, stems often almost filiform. Leaves always small, sheaths glabrous or hairy. Panicle 1-4 in., inclined or nodding; spikes rarely I in., very pale, rachis glabrous or pubescent. Spikelets \(\frac{1}{10}\)-\frac{1}{2}\) in. (excl. awns); gl. I ciliate, 1-3-nerved, awn \(\frac{1}{2}\) in. or less; II 3-5-nerved, awned; III 5-9-nerved, shortly awned, palea 0.—Usually very distinct from 0. compositus, but I have found specimens growing in the Jheels, with spikes nearly two inches long and stouter awns, forming a transition to that plant. Wall. Oat. 8678 is a very small Silhet form, with ovate leaves \(\frac{1}{2}\) in. Olarke found it also in Silhet.—O. africanus is the earliest name for the species under Oplismenus, but Burmannii is of universal adoption, and is the earliest specific name; both were given by Beauvois, O. africanus in 1807, O. Burmannii in 1812.

#### DOUBTFUL SPECIES.

O? DUBIUS, Kunth Revis. Gram. i. 44; Enum. Pl. i. 143.

# 12. ARUNDINELLA, Raddi.

Annual or perennial erect grasses. Leaves narrow. Spikelets panicled, not jointed on the pedicels, 1-2-fid. Glumes 4, membranous or subcoriaceous, I ovate acute or acuminate, rather shorter than II, 3 or 5-nerved; II lanceolate or ovate-lanceolate, acuminate or subaristate, 5-rarely 7-nerved;

III equalling I or rather longer, oblong, subacute or narrowly truncate 5-or 7-nerved, paleate, triandrous or neuter; IV much the smallest, bisexual, articulate at the base and deciduous, membranous and oblong in flower, lanceolate subcoriaceous and scaberulous when mature, and awnless or with one terminal subgeniculate awn more or less twisted at the base, and with sometimes 2 lateral shorter capillary awns, base usually bearded. Anthers long. Styles 2, free or connate below; stigmas long. Grain free within gl. IV.—Species about 30, tropical.

A very well marked genus, referred by Baillon (Bull. Soc. Linn. Paris (1893) 1023, 1083, 1093) to Pancoun, from which it differs in the marticulate spikelets with the small thin gl. IV articulate at the base, as also in gl. IV being awned in many species and bearded at the base. The species are most difficult of determination, the Peninsular especially, which have not been so collected as to provide sufficient material for satisfactory study. I greatly doubt the value of the characters afforded by the awns.

- \* Gl. IV with 3 awns, the lateral short, capillary. (Miliosaccharum, Nees.)
- 1. A. avenacea, Munro ex Thw. Enum. Pl. Zeyl. 362; annual, leaves short, panicle \(\frac{1}{2}\)-1 in. ovoid compact, spikelets \(\frac{1}{6}\)-\(\frac{1}{4}\) in. subsessile, gl. I and II awned, III awned acuminate, IV hispid or beaided, median awn flattened and strongly twisted at the base. Lisboa in Journ. Bomb. Nat. Hist. Soc. v. (1891) 345; Trim. Cat. Ceyl. Pl. 106. A. Campbelliana, Lisboa l.c. 346. Avena malabarica, Heyne ex Herb. Rottl.—Arundinella? Wall. Cat. 8670.—Aira, No. 3, Griff. Notul. iii. 55, Ic. Pl. Asiat. t. 146, f. 1II.

KHASIA HILLS, in wet places, alt. 3-4000 ft. Griffith, &c. Deccan Peninsula, from the Concan southward. Burma; Pegu, Kurz; Moulmein, Griffith.

CEYLON, in swamps, at Ratnapoora, Thwaites.

- A weak straggling slender grass. Leaves 1-2 in., ovate-lanceolate, acute, glubrous or pilose, base amplexicall and subpectinately ciliate; sheaths slender; ligule membranous, ciliate. Panscle pale green, branches short glabrous or hairy. Glumes I and II glabrous hairy or with tubercled-based bristles; I 3-5-nerved; II \(\frac{1}{2}\) longer, 5-nerved; III acute or acuminate, 5-nerved, paleate, male or neuter; IV linear-oblong, more or less hispidly pilose or with lateral beards, base with long hairs; lateral awas triangular at the base, median about twice as long as the spikelet, geniculate above the twisted portion.
- 2. A. tuberculata, Munro ex Lisboa in Journ. Bomb. Nat. Hist. Soc. v. (1891) 344; annual, erect, hispid with long white tubercled-based hairs, panicle lax, spikelets & in. shortly pedicelled, gl. I 3-nerved shortly awned, II nearly twice as long 5-nerved narrowed to a long beak, III male obtuse, IV glabrous, median awn slender twisted or not below.

The Concan; Poona, Stocks, &c. CENTRAL INDIA, King.

- Stem 12-18 in, sheaths leaves and panicle clothed with white spreading stiff hairs. Leaves 1-3 in., linear-lanceolate, base rounded; ligule a ridge of hairs. Panicle 3-6 in., narrowly oblong; branches 1-1 in., suberect, scaberulous. Spikelets ovoid, single or geminate, beak of gl. II as long as the rest of the gl.; III is long as I, narrow, glabrous, 5-nerved; IV lanceolate, scabrid when ripe, base pilose, median awn about twice as long as the spikelet, lateral accoular.
- 3. A. mesophylla, Nees ex Steud. Syn. Gram. 115; Nees & Arn. ex Wight Cat. n. 2347; annual, erect, pubescent or hirsute, leaves narrow, branches of compressed panicle spiciform short simple, spikelets sessile imbricate sub 4-ranked bifarious, gl. I. subawned 3-nerved, II rather longer

5-7-nerved, narrowed into a long beak, III obtuse male, IV lanceolate base pilose, median awn about  $\frac{1}{3}$  longer than the spikelet slender hardly twisted.—Arundinella, Wall. Cat. n. 8663 B.

TRAVANCOR; Pulney Mts. and Courtallam, Wight.

Stem 1-2 ft., branching from the base, slender. Leaves 3-4 by \(\frac{1}{4}\) in., base narrowed; ligule obscure. Panicle 2-4 in., hirsute, branches \(\frac{1}{2}\)-\(\frac{1}{4}\) in., sessile (i.e. flowering to the base), rachis hairy; spikelets distichously spieading. Gl. I hardly awned, ovate; II about \(\frac{1}{4}\) longer, lanceolate; III glabrous, narrowly oblong; IV not seen ripe, base bearded.

4. A. nervosa, Nees in Wall. Cat. n. 8662; annual, leaves narrow, softly hairy with spreading hairs, puncle much branched, branches capillary laxly many-fld., spikelets in pedicelled, gl. I acuminate 3-nerved. Il nearly twice as long 5-nerved narrowed into a long straight beak, III obtuse, IV ovate-lanceolate scaberulous, median awn slender. Steud. Syn. Gram 115; Wight Cat. n. 2387, 1669 α β γ. Holcus nervosus, Roxb. ex Wight Cut. n. 1669 (non Roxb. Fl. Ind.) Ischæmum melicoides, Koen. ms in Herb. Wight. Andropogon hirsutum & scoparium, Heyne in Herb. Rottl. Agrostis scoparia, Koen. ex Steud. l.c. Anemagrostis Neesiana, Wight & Arn. ex Steud. l.c.—Arundinella. Wall. Cat. n. 8665.

SOUTHERN DECCAN PENINSULA; Heyne, Wight, &c.

Stem 12-18 m., sleuder, branched from the base. Leaves 4-8 by  $\frac{1}{6}-\frac{1}{3}$  in, and sheaths usually copiously hairy on both surfaces with long white spreading hairs, base narrow; ligule membranous, ciliate. Panicle 6-10 in.; branches 2-4 in., fascicled and whorled, erect, flexuous, smooth, glabrous. Spikelets subcrect, glabrous or nerves of gl I and II more or less setose; gl. III neuter or male; IV slightly bearded at the base, median awn more or less twisted at the very slender base.—Wight's 8 larvor (Oat. 1669 b) is only a slender form.—Lisboa (in Journ. Bomb. Nat. Hist. Soc. v. (1891) 344) gives Concan, Coromandel and Ceylon as habitats, but without seeing specimens it is not safe to cite an authority in so difficult a genus. A nervosa, Duthie Grass. N.-W. Ind. 13, from the Himalaya is probably one of the forms of brasileensis.

5. A: setosa, Trin. Diss. ii. 63, Panic. Gen. 245; perennial, tall, leaves usually narrow, panicle 6-12 in., branches subsolitary slender erect laxly many-fid., spikelets \(\frac{1}{2}\)-\(\frac{1}{2}\) in. subsecund pedicelled, gl. I and II aristately acuminate glabrous or setose, I = \(\frac{2}{3}\)-\(\frac{3}{4}\) II 3-nerved, II elongate lanceolate 5-nerved, III shorter obtuse or subacute 5-7-nerved, IV = \(\frac{1}{2}\)-III lanceolate scaberulous. Steud. Syn. Gram. 114; Duthie Grass. N. W. Ind. 13. A. hirsuta, Nees ex Steud. l. c. 115, \(\frac{2}{3}\)-Hochst. in Hohen. Pl. Ind. Or. n. 920. A. setitera, Steud. l. c. 115. A. stricta, Nees in Hook. Kew Journ. ii. (1850) 102, Dalz. \(\frac{2}{3}\)-Gibs. Bomb. Fl. 292. Milium cimicinoides, Roxb. mss.—PArundinaria sp. nov. Lisboa in Journ. Bomb. Nat. Hist. Soc. v. (1891) 343.

WESTERN HIMALAYA; alt. 5-8000 ft., from Dalhousie to Nepal, Wallich, &c. Khasia Hills, alt. 3-6000 ft. Behar, on the Soane river, J. D. H. Central India, Clarke. Nilghiri Hills, alt. 6000 ft., Schmidt, &c. Ceylon; at Trin-

comalee, Ferguson.-DISTRIB. Tonkin, China, Philippines.

Stems densely tufted on a hard rootstock, 1-3 ft., stout or slender, leafy. Leanes 6-10 m., convolute, glabrous pubescent or villous; ligule obscure. Panicle 2-6 in., sometimes corymbiform; branches 2-5 in., usually naked below. Spakelets often in pairs, pedicels with sometimes a few hairs near the tip. Median awn of gl. IV about as long as the spikelet —The name hirsuta is attached to a specimen in Herb. Royle, so named no doubt by Nees.

6. A. khaseana, Nees ex Steud. Syn. Gram. 115; tall, robust, leaves narrow, paniele 6-18 in. branches long or short erect scabrid, spikelets  $\frac{1}{4-\frac{1}{3}}$  in. setose with long tubercled based bristles, gl. I and II aristately acuminate,  $I = \frac{3}{4}$  II 5-nerved, II 5-nerved, III acuminate or subaristate, IV oblong-lanceolate nearly smooth. Arundinella? Wall. Cat. n. 8672.

KHASIA HILLS; alt. 4-6000 ft., common.

Stem 3-6 ft., from a woody tufted rootstock, as thick as a swan's quill or less, nodes pubescent or bearded. Leaves 6-12 m., and sheaths glabrous pilose or villous; ligule a ridge of hairs. Panicle effuse or contracted or thyrsiform; branches 1-6 m. long. Spikelets pedicelled, crowded or distant, dark green; gl. IV. with the median awn variable in length, strongly twisted at the stout base, lateral awns short.

- \*\* Awn solitary, longer than the spikelet.
- † Spikelets about  $\frac{1}{12}$  in. long.
- 7. A. agrostoides, Trin. Sp. Gram. Ic. t. 265; annual, villous or glabrescent, leaves broad flat flaccid, panicle contracted, branches fascicled suberect, spikelets glabrous or setose, gl. I = \frac{3}{3} 11 ovate acuminate 3-5-nerved, II subaristately acuminate 5-nerved, III subaristately acuminate 5-nerved, IV Bull. Sc. Acad. Petersb. ii. (1836) 71. Brandtia holocides, Kunth Revis. Gram. ii. 129, t. 170; Steud. l. c.—Arundinella? Wall. Cat. n. 8671.

South Deccan, and the Concan, &c., Wight, &c. Tenasserim, Wallich,

Helfer.—DISTRIB. Philippines.

Stem 6-18 in., stout or slender. Leaves 1-4 in., up to \( \frac{1}{2} \) in. broad, narrowed to the base, and sheaths usually clothed with long soft hairs; ligule a ridge of hairs. Pancle 1-9 in., always contracted; branches \( \frac{1}{2} - 1 \) in., capillary, subserect, sparingly divided; gl. I and II rarely without bristles, III male or neuter; column of awn exserted, twisted.

Var. cilvata; panicle more copiously setose, spikelets rather larger. Arundinella ciliata, Nees in Wight Cat. n. 1666. A. pilosa, Hochst. in Hohen. Pl Ind. Or. n. 647 & 935; Miq. in Verh. Nedel. Ind. iii. iv. (1851) 30. Holcus ciliatus, Roxb. Fl. Ind. i. 318. Andropogon paniceus, Heyne ex Wall. l. c. & in Herb. Rottl. Perotis polystachya, Herb. Heyne ex Wall. l.c. The Deccan Peninsula, from the Concan southward. Moulmein, Griffith.—Arundinella, Wall. Cat. n. 8664.

8. A. tenella, Nees ex Steud. Syn. Gram. 115; annual, glabrous, leaves flaccid lanceolate, panicle very large effuse copiously branched, rachis and branches capillary spreading, spikelets \( \frac{1}{24} \) \( \frac{1}{12} \) in solitary long-pedicelled glabrous or sparsely setose, gl. I = \( \frac{2}{3} \) III 3-nerved, II ovate-lanceolate acuminate 5-nerved, III 5-nerved, IV oblong, awn twice as long as the spikelet. Wight Cat. n. 1668; Dalz. & Gibs. Bomb. Fl. 292; Duthie Grass. N.W. Ind. 13; Lisboa in Journ. Bomb. Nat. Hist. Soc. v. (1891) 345. A. pumila, Steud. l. c. 114; Lisboa l. c. Acratherum pumilum, Hochst. ex A. Rich. Tent. Fl. Abyss. ii. 414, t. 100. Anemagrostis tenella, Wight ex Steud l. c.

WESTERN HIMALAYA; Garwhal, alt. 4000 ft. RAJPOOTANA, on Mt. Abu, &c. Behar and Central India, alt. 3-4000 ft. The Khasia Hills, the Concan

and PEGU.-DISTRIB. Abyssinia.

Stem 6-20 in., erect, soft, leafy, very sparsely hairy. Leaves from ovate and 2-4 in. long, to linear-lanceolate and 14 in. long, often 3 in. broad, acuminate, membranous, many-nerved, base narrow; sheath rarely hairy; ligule short, hairy. Panicle 2-10 in.; rachis slender, strict, erect; branches alternate or the lower

subverticillately fascicled, each with widely spreading capillary branches and branchlets. Spikelets the smallest of the genus, usually shorter than their capillary pedicels; gl. 1V scabrid above; column of awn slightly twisted.

9. **A.** pygmea, Hook. f.; annual, very small, slender, leaves chiefly radical narrow hispidly hairy nerveless except the midrib margins serrulate, panicle erect effuse, branches few capillary, spikelets few  $\frac{1}{12}$  in. setose, gl.  $I = \frac{3}{3}$  II ovate acute 3-nerved, II ovate-lanceolate long-acuminate 5-nerved, III obtuse obscurely 5-nerved, IV oblong truncate, awn twice as long as the spikelet.

NORTH CANARA, Lisboa.

Whole plant 6 inches high and very slender.—Closely allied to A. tenella, but very much smaller, with very slender stem, narrow chiefly radical leaves  $1-1\frac{1}{2}$  in. by  $\frac{1}{10}$  in., sparsely clothed with long bristles, and a very sparingly divided paniele with few larger spikelets on very long capillary pedicel.—The specimens are very poor, and the character given may hence require modification.

10 A. Metzii, Hochst. ex Miq. in Verh. Ned. Inst. III lv. (1851) 31; tall, glabrous, leaves linear, panicle 3-10 in. effuse erect or inclined branches alternate or fascicled elongate, spikelts  $\frac{1}{12} - \frac{1}{10}$  in. subsecund, long or short pedicelled glabrous or sparsely setulose, gl.  $1 = \frac{3}{8}$  II ovate acuminate 3-nerved, II ovate-lanceolate acuminate 5-nerved, III acute 5-7-nerved, IV oblong truncate obtuse or retuse scaberulous, awn about twice as long as the spikelet. Steud. Syn. Gram. 116 (excl. Syn. Roxb); Hochst. in Herb. Hohenack. In. 257. A agrostoides, Trin. var. tenella, Herb. Ind. Or. Hf. § T. Agrostis fusca, Heyne ex Wall. Cat. § in Herb. Rottler.—Arundinella, Wall. Cat. n. 8668.

NILGHIRI HILLS; the Wynaad, Heyne. The Concan and Canara, Law, Metz,

Thomson, Woodrow, &c.

Annual? 1-3 ft. high. Leaves 4-6 by \(\frac{1}{2}\)-\frac{1}{3}\) in., scaberulous and sheath more or less harry or glabious. Panaele 1-8 in.; inches slender, smooth or subscaberulous; branches 1-4 in , uniformly flowering. Spikelets green or purplish, solitary or 2-nate, longer or shorter than their pedicels which are sometimes \(\frac{1}{2}\) in. long; gl I nerves sometimes scabrid; IV very obscurely bearded at the base, awm straight—Hohenacker's specimens appear to be annual, Heyne's have a small hard rootstock. This is certainly not Roxburgh's Holcus nervosus, which Steudel cites for it. The panicle varies greatly in length, breadth and composition; in small specimens it is short and triangular with spreading nearly simple branches, in taller it is more effuse with long flexuous branches and much longer pedicels.

†† Spikelets more than  $\frac{1}{10}$  in. long.

11. At villosa, Arn. ex Steud. Syn. Gram. 115; stems tufted villous below the very narrow panicle, rachis villous, branches spiciform short simple hirsute, spikelets  $\frac{1}{5}$ - $\frac{1}{4}$  in secund crowded setosely hirsute, gl. I =  $\frac{3}{4}$  II ovate acuminate 3-5-nerved, II subaristately acuminate 5-nerved, III acute 5-nerved neuter or male, IV oblong-lanceolate very minutely scaberulous, awn not twice-as long as the spikelet. Thu. Enum. Pl. Zeyl. 362; Trim. Cat. Ceyl Pl. 106.

EASTERN HIMALAYA, the KHASIA HILLS, CENTRAL INDIA, the DECCAN PENINSULA & CEYLON.

Stem 12-16 in., slender, stiff, leafy at the villous base. Leaves 4-8 by  $\frac{1}{12}-\frac{1}{10}$  in., strict, rather rigid, glabrous tomentose or villous; ligule of long hairs. Panacle 2-4 in., brown. Spikelets subdistichously crowded, spreading or erect; column of awn included twisted.—Nees, according to Steudel, describes gl. IV. as 2-toothed. I find it to be usually rounded at the tip, but 2-toothed in

var. himalaica. Gl. III is more acute than is usual in the genus and its palea

Var. Weghtii; leaves very narrow convolute, basal sheaths woolly.

Var. Heyne; taller, stouter, basal sheaths nearly naked, leaves longer broader and flat 12 by 1 in , panicle 4 in. long. Andropogon paniceus, Herb. Heyne ex Wall. Cat. n. 8663 A.—Courtallam, Wight.

Var. himalaica; basal sheaths naked, leaves 2-6 by \(\frac{1}{4}\)-\(\frac{1}{3}\) in. flat, spikes sometimes shortly pedancled, gl. IV 2-toothed. A. Hookerii, Munro ms.—Bhotan, E. Nepal and Sikkim Himalaya, alt. 6-11,000 ft., Griffith, J. D. H., Clarke.

12. A. birmanica, Hook. f.; annual, stout, stem glabrous, leaves linear-lanceolate flat hirsute, panicle linear-oblong interrupted, branches sessile simple or sparingly divided, rachis ciliate and scaberulous, spikelets 1 in. densely crowded subsessile glabrous or with a few setae, gl. I = % Il ovate subaristately acuminate 5-nerved, Il ovate-lanceolate longacuminate 5-nerved, III acute 5-nerved, IV oblong-lanceolate scabrid, awn not twice the length of the spikelet.

BURMA; Rangoon, M'Lelland, Scott, Kurz.

Stem tufted, 1-2 ft., stout, soft, leafy, nearly as thick as a goose-quill, nodes bearded. Leaves 4-8 by  $\frac{1}{2}$ - $\frac{2}{3}$  in., base subcordate, sheath husute; ligule a narrow collate membrane. Pancle 3-7 in., very pale, branches or spikes 1-2 in sessile, erect; gl. III male female or neuter, awn of IV with twisted included column .-Near A. villosa, but annual, with soft stems and leaves much smaller and hardly setose spikelets, stem glabrous below the panicle.

13. A. brasiliensis, Raddi, Agrost Bras 37, t. i. fig. 3; stem erect stout or slender, leaves broad or narrow, panicle pyramidal subcorymbose or thyrsiform sparingly or copiously branched, spikelets  $\frac{1}{3}$  in subsecund longer than their pedicels usually quite glabrous, gl.  $I = \frac{2}{3}$  II ovate-lanceolate acuminate 3-nerved, II lanceolate finely acuminate 5-nerved, III subacute 5-nerved, IV oblong-lanceolate acute scaberulous, awn twice as long as the spikelet Trin. Diss 11. 62, Panic. Gen. 246, Sp. Gram. Ic. t. 266; Doell in Mart. Fl. Bras. ii. II, 298, t. 38. A. Ecklonn, Nees Fl. Afr. Austr. 80. A martinicensis, Trin. Diss. ii. 62; Panic. Gen. 246; Griseb. Fl. Brit. W. Ind 556. A. Mikam, Nees Agrost Bras. 465. A. nepalensis, Trin Diss. ii. 62; Panic. Gen. 335, Sp. Gram. Ic. t. 268; Duthie Grass. N.W. Ind. 13; Steud. Syn. Gram 115; Lisboa in Journ. Bomb. Nat. Hist. Soc. v. (1891), 343. A. pallida, Nees Agrost. Bras. 465. A. rigida, Nees Fl. Afr. Austr. 80. A. Ritchiei, Munro ex Lisboa l c. A. stricta, Nees in Hook. Kew Journ. ii. (1850), 102; ? Dalz. & Gibs. Bomb. Fl. 293. Acratherum miliaceum, Link Hort. Berol. i. 320. Orthopogon agrostoides, Trev. ex Steud. Nom., Ed. 11. ii. 234. Aira brasiliensis, Spreng Syst. Veg. 1. 278. Goldbachia Mikani, Trin. in Spreng. Neue Entdeck. 11. 81. Ischemum hispidum, H. B. & K. Nov. Gen. & Sp. i. 194; Kunth Revis. Gram. i. 373, t. 100; Enum. Pl. 1. 515. Riedeliea Mikani, Trin. ex Kunth Enum. l. c. Holcus nervosus, Roxb. Fl. Ind. i. 318. Thysanachne scoparia, Presl Nov. Pl. Gen. Diss. 1829, cum Ic. Rel. Hank. i. 253. Andropogon hispidus, Willd. Sp. Pl 1v. 908. A.? epiphyllus, Wall. Cat. n. 8667 A. A. virens, Spring. Syst i 287.— Airacea, Griff. Notul. 53, Ic. Pl. Asiat. t. 141, f. 11.—Arundinella, Wall. Cat. n. 8666, 8667.

Throughout the hilly parts of India, from the Himalaya, ascending to 7000 ft., to BURMA and CEYLON. - DISTRIB. China, Malaga, Australia, S. Africa, trop. America.

Perennial; rootstock stout, hard, creeping and sending out stout sheathed branches sometimes as thick as a goose-quill, or tuited and intricately branched.

- Stems 1-5 ft., from the thickness of a sparrow's to a goose quill, simple or branched, nodes glabrous or pubescent. Leares 6-12 by  $\frac{1}{6}$ - $\frac{2}{3}$  in., usually ciliate at the narrow base; ligule of soft hairs. Panicle 4-18 in.; branches 1-10 in., few or many, fascicled or subverticillate, densely or laxly imbricating, usually slender and undivided. Spikelets distant or crowded, green or purplish; gl. I sometimes very sparingly setose; III male or neuter, rarely imperfectly bisexual; IV always bearded at the base, column of awn more or less twisted.—An abundant grass in many parts of India, but so variable that it is difficult to formulate a character for it that will not include other species. Dr. Stapf has aided me in the examination of a mass of Indian specimens, including many hundreds collected by Clarke over the length and breadth of India; and especially in the more important matter of identifying A. nepalensis with the American A. brasiliensis, and various others here brought together as synonyms. The largest form is Wallich's 8656 A, with a stout creeping woody rhizome, sheathed surculi as thick as a goose-quill, a stout stem 5 ft. high, broad often hirsute leaves, and a large panicle 6-12 in long of spikelets 1/8 in. long; it is a tropical and subtropical plant extending in the Himalaya from Kumaon eastward, and is common in the Khasia Hills. Wallich's 8666 B (from the Calcutta Bot. Gardens?) is a tall much more slender plant, with matted roots, very narrow leaves with tubercle-based hairs, and a slender thin panicle. His 8667 A. B. from Burma, is a tall plant with soft hairy leaves  $\frac{1}{4}-\frac{1}{2}$  in. broad, and an effuse subpyramidal panicle with fascicled capillary branches and smaller spikelets about 1 in. long. It is common throughout the lower Himalaya and Khasia Hills. Another variety, with a straggling branching rootstock, proliferously fascicled branches sheathed at the base, short or long glabrous or hairy linear-lanceolate leaves, and small oblong panicles with few slender branches and few spikelets, occurs at elevations of 4-6000 ft. Lastly, there is a common Himalayan slender form from the Panjab eastwards, six inches to a foot high, with tufted roots, very narrow leaves, a small oblong panicle, and small spikelets. A. Retchier, Munro, is a tall stout Concan form, 2½ ft. high, with a shortly creeping rootstock, narrow obscurely hairy convolute leaves, a very narrow pamele, and pale small spikelets.
- 14. A. fuscata, Nees ex Buese in Mig. Pl. Jungh. 359; perennial, stout, rather short, leaves short flat hirsute, panicle oblong dense-fld. usually purplish, rachis stout pubescent or villous, branches crowded erect, spikelets  $\frac{1}{8} - \frac{1}{5}$  in secund crowded sessile or shortly pedicelled glabrous or sparsely setose, gl. I = 3 II broadly ovate acuminate 3-5-nerved, II ovate-lanceolate acuminate 5-nerved, III obtuse or truncate 5-nerved, IV oblong-lanceo-late emarginate scabrid, awn short. Steud. Syn. Gram. 114; Wight Cat. n. 1667; A. purpurea, Hochst. ex Steud. 1. c. 115; PLisboa in Journ. Bomb. Nat. Hist. Soc. v. (1891) 345. Acratherum fuscatum, Nees ex Steud. l. c.

The Concan (Lusboa). NILGHIRI HILLS, Heyne; Octacamund, alt. 6000 ft.,

- Wight, Lawson, King. PEGU, at Rangoon, Kurz.

  Stem 1-2 ft., stiff, glabrous or pubescent below the panicle. Leaves 1-8 by 1-1 in , lanceolate, tapering from the base to the tip, coriaceous, strongly nerved; sheath hirsute; ligule very short, ciliate. Panicle 2-5 in., erect; rachis and subsimple branches stiff, angular, scaberulous. Spikelets stouter and glume much broader than in any form of brasiliensis.—Heyne's specimens are more slender than Lawson's. I have seen no specimens from the Concan. The Rangoon plant has a very pale panicle.
- 15. A. capillaris, Hook. f.; perennial, very slender, leaves narrow glabrous or hairy, panicle oblong branches alternate slender flexuous naked below, spikelets in distant solitary glabrous shorter than their pedicels, gl. I = 3 II ovate-lanceolate acuminate 3-5-nerved, II lanceolate acuminate 5-nerved, III not exceeding I obtuse 5-nerved, IV lanceolate acute scabrid, awn about twice as long as the spikelet. A mutica, Nees ex Steud. Syn. Gram. 116; P. Lisboa in Journ. Bomb. Nat. Hist. Soc. v. (1891)

8. Andropogon capillaris, Herb. Heyne.—Arundinella sp., Wall. Cat. n. 8665 A.

The DECCAN, Heyne. PULNEY HILLS, Herb Wight (p. 3338).

Stem erect from a tuberous rhizome which is clothed with the woolly bases of leaf-sheaths. Leaves 6-12 by  $\frac{1}{10}-\frac{1}{3}$  in., acuminate, base rather narrow; upper sheaths glabrous; ligule a ridge of hairs. Panicle 5-7 in., flexuous; rachis filiform, scaberulous; branches few, 4-6 in., naked below except a solitary long-pedicelled axillary spikelet; pedicels capillary.—An obscure plant. Nees describes the leaves as with sparsely setulose margins, and gl. IV as mucronate, from which it is evident that the awn has fallen away in his specimen. This latter suggested the name mutica, which, being misleading, I have replaced by Heyne's of capillars. Wight's Pulney specimens have a slightly hairy panicle 3 in. long, with more numerous close-set branches and closer spikelets. Lisboa (Journ. Bomb. Nat. Hist. Soc. v. (1890) 344) gives mutica as a common plant all over Bombay, but without seeing specimens I cannot confirm this.

16. A. laxiflora, Hook. f.; very slender, glabrous, leaves narrow, panicle effuse, branches spreading capillary solitary alternate or opposite or the lower fascicled, branchlets spreading, spikelets  $\frac{1}{2} - \frac{1}{6}$  in. solitary shorter than their capillary pedicels, gl. I =  $\frac{2}{5}$  Il ovate acuminate 3-nerved, II ovate-lanceolate 5-nerved, III longer than I oblong acute, IV longer than III oblong-lanceolate scaberulous, awn 0 or shortly exserted. A. nervosa, Thw. Enum. Pl. Zeyl. 362 (excl. Syn.); Trim. Cat. Ceyl. Pl. 106.

CEYLON, Gardner; Central Province, alt. 3-5000 ft, Thuaites (C.P. 919). Annual? glabious. Stem 12-30 in., tufted, geniculately ascending, nodes glabrous. Leaves 4-8 by \$-\frac{1}{8}\$ in , finely acuminate; hgule narrow, membranous, ciliate. Panicle 4-6 in., green. Gl. 1 scabrid on the keel or not; IV bearded at the base or not; column of awn twisted—The open panicle with long capillary pedicels of the spikelet and quite acute gl. III which is \$\frac{1}{2}\$ longer than I, characterize this species. One specimen (Gardner, n. 1007) has no trace of an awn.

- \*\*\* Awn 0, or very short and hardly exserted (see also A. laxiflora).
- 17. A. Wallichii, Nees ex Steud. Syn. Gram. 114; perennial, stout, erect, panicle elongate contracted strict, branches 1-1½ in. stout stiff spiciform, spikelets 3-4-seriate ovoid secund densely imbricate very stoutly pedicelled setose, gl. I nearly = II ovate acute 3-5-nerved, III oblong obtuse 5-nerved, IV ovoid subacute nearly smooth, awn 0 or very short. Duthie Grass. N.W. Ind. 13. Panicum strictum, Roxb. Fl. Ind. i. 303. P. bengalense, Spreng. Syst i. 311; Steud. Syn. Gram. 48. P. pyramidale, β ? Herb. Ham. ex Wall. Cat. n. 8700.—Panicum, Wall. Cat. n. 8700.—Arundinella ? Wall. Cat. n. 8669.

TROPICAL HIMALAYA; on dry banks from Simla to Sikkim, alt. 1-6000 ft. BENGAL, BEHAB, the KHASIA, NAGA and SATPURA HILLS. BURMA; Shan Hills, Manders.—DISTRIB. Tonkin.

- Stem 1-3 ft., from a woody creeping or tufted hard rhizome; nodes bearded or not. Leaves 12-18 by  $\frac{1}{3} \frac{2}{3}$  in., all radical in small forms, glabrous hairy or villous, lauceolate, acuminate; sheath smooth scabrid or villous; ligule a ridge of hairs. Panicle t-12 in. (the stoutest of the Indian species); branches  $\frac{1}{3}$ -1 in, lower sometimes whorled, erecto-patent, flowering to the base; rachis angular, scabrid. Spikelets green or purplish; gl. IV naked at the base; awn not twisted.
- 18. **A. Clarkei**, Hook. f.; tall, very stout, leaves very long, panicle very large subcorymbitorm, branches 3-8 in. fascicled erect very slender simple upper much longer than the rachis, spikelets  $\frac{1}{10} \frac{1}{8}$  in. 1-2-seriate secund shortly pedicelled, gl.  $I = \frac{3}{4}$  II ovate acute 5-nerved, II ovate-

lanceolate acute 5-nerved, III oblong obtuse, IV ovate-lanceolate, awn very shortly exserted base twisted.

SIRKIM TERAI, Clarke.

Stem 6 ft. or more, stouter than a swan's quill above. Leaves 2-3 ft. by 1 in., coriaceous, hairy beneath; sheath long, margins fimbriate; ligule a ridge of hairs. Panicle 12-18 by 4-6 in.; rachus stout, erect, angular, nearly smooth; brancher rarely divided, filiform, scaberulous. Spikelets solitary or 2-nate, pale, usually longer than their pedicels.—The great size, large panicle with long branches, the upper far exceeding the rachis, will characterize this gigantic species.

19. A. leptochloa, Hook. f; tall, slender, leaves narrow, panicle pyramidal or subcorymbiform often interrupted, branches short simple slender alternate whorled or fascicled, spikelets  $\frac{1}{10}$  in 1-2-seriate secund sessile or pedicelled glabrons, gl. I =  $\frac{3}{4}$  II ovate acuminate 3-nerved, II ovate-lanceolate acuminate 5-nerved, III ovate-oblong subacute 5-nerved, IV lanceolate scaberulous base naked, awn minute or 0. Panicum leptochloa, Nees ex Steud. Syn. Gram. 62; Wight Cat. n. 1621; Steud. Syn. Gram. 62; Thiv. Enum. Pl. Zeyl. 360; Trim. Cat. Ceyl. Pl. 105. P. zeylanicum, Arn. mss. Leptochloa P panicoides, Herb. Wight, n. 125, ex Steud. l. c. L. pectinata, Steud. l. c.

MALABAR; at Quilon, Wight. CEYLON, not uncommon, Thwaites.

Stem 2-4 ft., from a woody rootstock, as thick as a crow-quill or less; nodes glabrous. Leaves 6-10 in., rarely \(\frac{1}{2}\) in. broad, glabrous or harry; sheath smooth or harry; ligule obscure. Panicle 2-14 in., rachis faintly scaberulous; branches 1-4 in., suberect, rarely spreading, slender, not flexuous; axils bearded or cihate. Spikelets rarely longer than their pedicels; gls. thin, nerves of I scabrid.

Var. gracilima; more slender, leaves narrower, panicle pyramidal, branches alternate very distant, spikelets more distant very shortly pedicelled.—Cochin,

Johnstone, in wet places. Nilambar, Lawson.

20. A. Lawsoni, Hook.f.; tall, stout, leaves linear-lanceolate acute scabrid above, panicle tall pyramidal, rachis scabrid, branches fascicled or subverticillate erecto-patent filiform strict simple or lower branched, spikelets  $\frac{1}{6}$  in solitary or 2-nate glabrous about equalling their pedicels, gl. I =  $\frac{2}{3}$  II ovate acuminate 3-5-nerved, II ovate-lanceolate acuminate 5-nerved, III obtuse 5-7-nerved, IV lanceolate scaberulous base naked, awn 0.

NILGHIRI HILLS; in swamps at Goodaloor, alt. 3000 ft., Lawson.

Stem erect, 3-4 ft high, nearly as thick as the little finger below. Leaves, lower few, 8-12 by \( \frac{3}{2} \) in., narrowed from the base to the acuminate tip, flat, rigid, upper very narrow; midrib slender; nerves very many and close, margins scabrid; sheath hairy; ligule 0. Panicle dull blue-puiple; rachis strict and branches scaberulous; branches alternate or fascicled, lower 4-6 in. branching at the base. Spikelets glabrous, sessile or pedicelled, longer or shorter than their slender pedicels; gls. rather coriaceous, nerves strong.—A very distinct-looking plant, unlike any known to me, but I have seen only one specimen, and it may prove to be a form of A. leptochloa.

21. **A. gigantea**, Dalz. in Dalz. & Gibs. Bomb. Fl. 293; tall, stout, upper leaves  $1-1\frac{1}{4}$  in. broad lanceolate base rounded or subcordate, paniele subcorymbosely thyrsiform, rachis stout, branches 2-4 in. densely crowded slender simple erect angular, spikelets  $\frac{1}{12}$  in. 2-3 seriate secund very shortly pedicelled, gl. I =  $\frac{3}{4}$  II broadly ovate acute 3-nerved, II ovate acuminate

5-nerved, III rather longer than I, obtuse 5-nerved, IV lanceolate base naked, awn 0.

The CONCAN, Stocks; Kineshwur, at the foot of the Ghats, Dalz. & Gibs.

Stem 6 ft., branched below, as thick as a goose-quill at 18 in. below the panicle, nodes swollen. Leaves 12-24 in., finely acuminate, subcoriaceous, many-nerved, scabrid above, glabrous or sparingly hairy, margins smooth; sheath sparingly hairy; ligule a narrow glabrous membrane. Panacle 5-7 in. long by 2-3 broad, brush-like, branches uniform, quite concealing the angular scabrid rachis Spilelets brownish, short and broad, keel of gl. I scabrid.—A distinct-looking plant, nearest perhaps to A. Clarles in inforescence.

22. A. blephariphylla, Trim. mss.; tall, stout, leafy, leaves long broad thin smooth, margins setosely serrulate, panicle broadly oblong, branches laxly whorled spreading filiform, spikelets \( \frac{1}{2} \) in. subsolitary as long as their pedicels glabrous, gl. I = \( \frac{1}{4} \) II broadly ovate acute 3-nerved, IV oblong subacute 5-nerved, IV lanceolate scaberulous base naked, awn 0.—Panicum blephariphyllum, Trim. in Lond. Journ. Bot. xxii (1885) 272, Cat. Ceyl. Pl. 105.

CEYLON; margins of woods by the sea at Resanwelle, Ferguson, Trimen.

Annual? Stem 3 ft. and upwards, nodes glabrous. Leaves 12-18 by nearly 1 in, rather membranous; sheath loose; ligule obscure Panicle 4-6 in.; rachis strict, nearly smooth; branches spieading or subrecurved; axils hairy.—The specimens are few, but the species appears to be a distinct one, nearest to A. leptochloa, which has narrower more corraceous leaves and smaller spikelets.

23. A. Thwaitesii, Hook. f.; very slender, glabrous, leaves very narrow, panicle oblong effuse, branches capillary solitary alternate or the lower fascicled, branchlets spreading, spikelets \(\frac{1}{2}\) in solitary shorter than their capillary pedicels, gl. I = \(\frac{2}{3}\) III very broadly ovate acute 3-5-nerved, III broadly ovate acuminate 5-nerved, III as long as II acute 7-nerved, IV lanceolate acute, awn 0. A. nervosa, var. Thwaites mss.

CEYLON, Walker?; Ambagamowa district, Thwaites (C.P. 3782).

Stem 2-3 ft., strict, erect; nodes glabrous. Leaves 4-8 by \(\frac{1}{8}-\frac{1}{4}\) in., finely acuminate, ligule a short cliate membrane. Panicle 3-5 in., branches naked at the base. Spikelets more turgid and coriaceous than usual in the genus, with shorter, broader, shorter pointed, purplish glumes; IV naked at the base.—Nearly allied to A. laxifora, but has much broader glumes, of which III is longer than I and about as long as II.

#### UNDETERMINABLE SPECIES.

A. INDICA, Trin. mss. ex Steud. Nom. Ed. II i. 143 = Agrostis biseta, Herb.

Spreng.—Name only.

A. SPICATA, Dalz. in Dalz. & Gibs. Bomb. Fl. 293; stem 1 ft., leaves 1-1½ by ½ in. ensiform and sheaths hispid, spike 1½ in. cylindric (as in Setaria) dense-fld. gl. I ½ in. lanceolate subulate subpilose 3-nerved, upper ½ in. long-attenuated and folded concealing the awn.—The Concan, on the Mahableshwur Hills, common.

A. JAPONICA, Duthes Grass. N.W. India, 13.

### 13. SETARIA, Beauv.

Spikelets 1- rarely 2-fld, not awned, clustered on the very short branches of a spike-like or narrowly pyramidal panicle, articulate on very short pedicels which bear a persistent involucel of few or many scabrid or barbed bristles (barren branchlets). Glumes 4, membranous; I = about

½ III; II = or shorter than IV; III neuter, rarely paleate and male, 5-7-nerved, IV coriaceous, plano-convex, bisexual, triandrous. Styles distinct. Grain free within the hardened gl. and palea.—Species about 10, temperate and tropical.

Distinguished from Panicum by the involucel, but connected with it by P. plicatum and S Forbesiana; and from Pennisetum by the persistent involucels and articulate decidnous spikelets. The species are for the most part difficult of limitation, and much of the synonymy requires revision.

1. S. italica, Beauv. Agrost. 51; leaves broad, panicle dense inclined or nodding simple and cylindric or lobed or compound, bristles few smooth or with minute spreading barbs, gl. I oblong or subglobose nearly smooth. Kunth Revis. Gram 146, Enum. Pl. i. 153, Suppl. 108; Reichb. Ic. Fl. Germ. t. 47; T. Nees Gen. Fl. Germ. Monocot. i. n. 22, Wall. Cat. n. 8643; Trim. Cat. Cevl. Pl. 107; Artchis. Cat. Panjab. Pl. 162; Duthie Grass. N.W. Ind. 8, Field & Gard. Crops, 5, t. 25, Fold. Grass. N. Ind. 15; Mig. Fl. Ind. Bat' iii. 467; Griseb Fl. Brit. W. Ind. 554. S. asiatica, Hort. ex Reichb. Fl. Germ. Excurs. 29. S. compacta, Schur. Enum. Pl. Transylv. 967, Index S. erythrosperma, flavida, persica & violacea, Hornen ex Reichb. l. c. S. germanica, Beauv. Agrost. 51, t. 13. S. globularis, Presl. Rel. Haenk. 407; Miq. l.c. S. macrochæta, Sch. Mant. ii. 274. S. maritima, R. & S. Syst. ii. 492. S. melinis, Link. ex Steud. Nom. Ed. II. ii. 574. S. panis, Jessen Deutschl Graes. 248. Panicum ægyptiacum & sibiricum, Hort ex Roem. & Sch. Syst. ii. 493. P. asiaticum, mel-frugum, & serotinum, Hort ex Schult. Mant. ii. 598, 599. P. attenuatum, setaceum & setosum, Hort. ex Trin. Gram. Panic. 166. P. brevisetum, Doell Fl. Grossh. Bad. 233. P. compactum, Kit. in Schult. Œster. Fl. Ed II. i. 212. P. elongatum, Salisb. Prodr. 18. P. germanicum & indicum, Mill. Gard. Dict. Ed. 8, n. 1 & 3. P. globulare, Steud. Nom. l. c. 51; Syn. Gram. l. c. P. glomeratum, Moench. Meth. 207. P. intermedium & erythrospermum, Vahl ex Hornem. Hort. Hafn. i. 82. P. italicum, Linn Sp. Pl. 56, Host l. c. t. 314, Trin. Sp. Gram Ic. t. 188, 189; Roxb. Fl. Ind. 1. 302; Steud. Syn. Gram. 51; Dalz & Gibs. Bomb. Fl. Suppl. 98; Wight Cat. n. 1645. P. miliaceum, Blanco Fl. Filip. Ed. I. 39. P maritimum, Hort. ex Lamk. Encycl. iv. 737. P. pumilum, Link Enum. Hort. Berol 76. P. vulgare, Wallr. in Linnea, xiv. (1840) 542. Pennisetum macrochaetum, Jacq. Eclog. Gram. iii. 36, t 25; Kunth Enum. i. 152.—Setaria, Wall. Cat. n. 8651.—Rheede Hort. Mal. xii. t. 79.

HAB. Cult. throughout India, and up to 6000 ft. in the Himalaya.—Distrib. Most warm, temperate and tropical countries.

Stem 2-5 ft, usually branched, tufted, rooting towards the base, often robust. Annual Leaves often long broad, margins retrorsely hispid, sheath smooth, mouth bearded Spiciform panicle 3-5 in. long, very variable in diameter, number and length of bristles of involucel, and size and form of gl. IV.—Possibly a cultivated form of S. virulis, but nothing is known of its origin, which reaches back to the period of the Swiss Lake-dwellings. It has from time immemorial been cultivated in Asia, and one form is regarded by the natives as indigenous in Japan and China (see Du Candolle l'Origine des Plantes Cultivées, p. 303). Duthie and Stewart regard some small forms as indigenous in India, but they are more probably escapes or their progeny.

2. S. glauca, Beauv. Agrost. 51; panicle spiciform cylindric, involucels of 6-12 bristles with spreading or erect barbs, gl. IV transversely rugose. Kunth Enum. Pl 1. 149, Suppl. 106; Wall. Cat. n. 8639; Griff. Notul. 44, Ic. Pl Asiat. t. 149, f. 1; Dalz. & Gibs. Bomb. Fl 293; Aitchis.

Cat. Panjab. Pl. 162; Trim. Cat. Ceyl. Pl. 105; Mig. Fl. Ind. Bat iii. 466; Duthie Grass. N.W. Ind. 8, Indig. Fodd Grass. t. x., Fodd. Grass. N. Ind. 14; Griseb. Fl. Brit. W. Ind. 554; Benth. Fl. Austral. vii 492; Reichb. Ir. Fl. Germ. t. 47; Boiss Fl. Orient. v. 442; Baker Fl. Maurit. 442. S. aurea, Hochet. ex A Br. in Flora, xxiv. (1841) 276. S. auricoma, Link. ex Loud Hort. Britt. 25. S. chrysantha, Heynk. Nom. ii. 661. S. flava, Kunth Rev. Gram i. 46. S. helvola, Roem. & Sch. l. c.; Miq. l c. 467. S. humifusa & rubicunda, Dum. Obs. Gram. Belg. 139. S. pumila, Sch. Mant. ii. 274. PS. sciuroidea, C. Muell. in Bot. Zeit. xix. (1861) 316. S. tejucensis, Kunth Enum. Pl. i. 150 S. Ventenatii, Kunth Rev. Gram. i. 251, t. 37. S. dasyura, Hort. Hal. ex Schlecht in Linnea, xxvi. (1853) 463. S. penicillata, Nees in Wall. Cat. n. 8640 A. B. C. E. Panicum alopecuroides, Koen. ex Trin. Gram. Panic 162. P. chrysanthum, Steud. Nom. Ed 2, ii. 254 P. flavescens, Moench. Meth. 206. P. glaucum, Linn. Sp. Pl. 56; Host Gram Austr. ii. t. 16, Trin. Sp. Gram. Ic. t. 195; Roxb. Fl. Ind. i. 285; Thw. Enum. 361; Wight Cat. n. 1643; Benth. Fl. Hongk. 411; Nees Fl. Afr. Austr. 55, Agrost. Bras. 241. P. helvolum, Linn. f. Suppl. 107. P. holcoides, Jacq. Eclog. Gram. t. 22. P. lævigatum, Ell. Sketch. i. 112. P. lutescens, Weig Obs 20. P. luteum, Guldenst. Reis. ii. 58. P. minimum, Wall. Cat. 8641 B. P. penicillatum, Willd. ex Nees Agrost. Bras. 242; Willd. \$\beta\$ (or \$P\$. helvolum, Linn.) Wight Cat. n. 1644. P polystachyum, Herb. Heyne ex Wall Cat. 8639 E. P. pumilum, Poir. Encycl. iv. 273 (ex Kunth l. c.). P. Ventenatii, Steud Nom. Ed. II, ni. 265. P. verticillatum, Rottl. ex Spreng Syst. i 304. P. viride, Poll. Hist. Pl. Palat. i. 55. Pennisetum glaucum & helvolum, Br. Prodr. 195.

Throughout India, especially in cult. ground.—Distrib. All warm, temp. and

trop. regions.

Annual. Stem 1-2 ft erect or ascending, simple or branched. Leaves broad or narrow, sometimes 18 by \( \frac{1}{3} \) in., flat, glabrous or sparsely hairy, margins scabrid Spiciform panicles cylindric, 1-7 in., dense-fld., usually yellow, rarely purplish or green, rarely interrupted; sometimes reduced to an ovoid head with very few spikelets; bristles of involucel 6-12, very variable in length, from a little longer to four times as long as the ovoid spikelet; gl. I minute; II rather shorter than III, subacute; III usually empty, sometimes paleate and male; IV broadly ovoid, very convex.

Var. macrocarpa; gl. III and IV equal and subsimilar in the ripe state, forming a subglobose crustaceous rugose sphere  $\frac{1}{2}$  in. diam., III paleate empty, IV fem., bristles of involucel  $\frac{1}{2}$  in. pale rufous.—The Panjab, Astchison, Western Beng il and Behar, Kurz.—A remarkable form, but passing into the ordinary state of the plant

by intermediates

Var. parvitora, Munro mss.; stems 6-10 in. branched and decumbent below, leaves smaller, spiciform panicle \(\frac{1}{2}\)-1 in., ovoid nearly white, bristles of involucel \(\frac{1}{2}\)-1 in gl. IV much less strongly rugose.—? S. imberbis, Roem. \(\frac{2}{3}\) Sch. ii. 891; Wall. Cat n. 8641 A in part, B-F. Panicum Codaea, Herb. Ham. in Wall. Cat. l. c.— Kumaon, alt. 4-5000 ft., Duthie. Khasia Hills, alt. 5000 ft., Clarke. The Concan, Madras and Burma, Wallich.—Probably the S. imberbis, of Africa, &c., but a smaller plant, with very small spikes, differing in this respect and in the less rugose gl. IV from S. glauca.

3. S. intermedia, Roem. & Sch Syst. ii. 489; panicle narrowly pyramidal subspiciform or very slender with segregate clusters of involucels, bristles of involucel with spreading or suberect barbs, gl. IV small oblong subrugulose. Kunth Enum. Pl. i. 150; Artch. Cat. Panyab. Pl. 162; Trim. Cat. Ceyl. Pl. 105; Duthie Grass. N.W. Ind. 9, Fodd. Grass. N. Ind. 14; Mig. Fl. Ind. Bat. iii. 466. S. verticillata, Wall. Cat. n. 8642 (D. in.

part) G. S. glauca, Hochst. Pl. Hohenack. n. 937. Panicum intermedium, Roth Nov Sp 47; Thw. Enum. 361.

Plains and lower hills of India, but not common. Himalaya, the Panjab, to Bengal, Central India, and the Nilghiri Hills. Ceylon, in shady places, Thwaites.—Distrib Temp and trop. regions.

Undistinguishable from S. verticillata except by the bails of the bristles of the

involuced not being reversed. It is probably a common but overlooked grass.

4. S. verticillata, Beauv. Agrost 51; panicle subpyramidal or subspiciform, lower involucels in segregate clusters, bristles with reversed barbs, gl IV minutely rugulose Kunth Enum. Pl 1 152; Wall. Cat n. 8642 A. B. C. D in part, E. F.; Dals. & Gibs. Bomb. F1. 294; Autch. Cat. Panjab Pl. 162, Trim. Cat. Ceyl. Pl. 105; Duthie Grass. N.W. Ind. 9, Fodd. Grass. N. Ind. 15; Benth. Fl. Austral. vii. 494, Host Gram. Austr. t. 13; Reichb Ic Fl. Germ t. 47; T. Nees Gen. Fl Germ. Monoc. n 22. S. floribunda, Spreng. Syst. i 305; Wall. Cat n. 8642 E S. nubica, Link. Hort. Berol. i. 220. S. respiciens, Hochst. ex Mig. Fl Ind. Bat. iii. 467. S. verticilliformis, Dum. Fl. Belg. 150. S. Rottleri, Spreng. Syst. Veg 1. 304; Steud Syn. Gram. 153. FS. tomentosa, Kunth Revis Gram. i 47; Enum. Pl. i. 157. Panicum Aparine, Steud 52. P. adhaerens, Forsk. Fl. Ægypt. Arab. 20. P. asperum, Lamk. Fl. Fr. iii. 577. P. floribundum, Willd. ex Spreng. Syst. 1. 306. P. humile, Trin. Gram. Panic. 167. P. italicum, Ucria, Hort. Reg Panorm. 54. P. respiciens, Hochst. ex Steud. L. c 52. P. rude, Lumk. ex Steud. Nom. Ed. 1, 589, 772. P. P. tomentosum, Roxb. Fl. Ind. i. 301. P. verticillatum, Linn. Sp. Fl. Ed. II, 82; Roxb. Fl. Ind. i. 301; Thu. Enum. 361; Trin. Sp. Gram Ic. t 202. P. viride, Desf. Fl. Atlant. i. 58. Pennisetum verticillatum, Br. Prodr. 195. Penn. respiciens, A. Rich. Tent. Fl. Abyss. ii. 379.

Throughout INDIA, in shady places, ascending the Himalaya to 6000 ft. CENLON,

not very common. - DISTRIB. Temp. and trop. regions.

Annual. Habit of S. glauca but usually more flaccid. Leaves sometimes 1 inbroad, scaberulous. Pancle 2-7 in. long, erect or curved, green; bristles of involucel one or few, about  $\frac{1}{6}$  in long, flexuous. Spakelets  $\frac{1}{14}$ -12 in.; gl. I about  $=\frac{1}{2}$  III; II about = IV which is nearly smooth and shining.

5. S. viridis, Beaux. Agrost. 51; panicle spiciform cylindric often interrupted, bristles of involucel 3-6 with erect or spreading barbs, gl. IV oblong minutely punctulate or subrugulose. Kunth Enum. i. 151; Aitch. Cat. Panyab. Pl. 162; Miq. Fl. Ind Bat. iii. 467, Host Gram. Austr. ii. 14; Fl. Dan. t. 352, Reichb. Ic. Fl Germ. t. 47; Boiss. Fl. Orient. v. 443; Benth. Fl. Austral. vii. 494; Griseb. Fl. Brit. W. Ind. 554; Duthie Grass. N.W. Ind. 9. S. affinis, Schult. Mant. ii. 275. S. ambigua, Guss. Fl. Sic. Syn. i. 114. S. chlorantha, Schur Enum. Pl Transs. 723. S. decipiens, C. Schimp, ex Nym. Conep. 787. S. imberbis & Weinmanni, Roem. & Schult. Syst. ii. 891, 490. S. nana, Dum. Obs. Gram. Belg. 139. S. penicillata, Wall. Cat. n. 8640 D. S. villosa, Beaux. Agrost. 51. Panicum bicolor, Moench. Meth. 206. P. cynosuroides, Scop. Fl. Carn. Ed. II. i. 50. P. humile, Thunb. ex Trin. Gram. Panic. 164. P. imberbe, Poir. Encycl. Suppl iv. 272. P. lævigatum, Lam. Fl. Fr. iii. 578 P. psilocaulum, Steud. Syn. Gram. 50. P. purpurascens, Opiz. in Flora, v. 266; Raddi ex Nees Agrost. Bras. 240. P. quale Linnæi, Krock Fl. Siles i. 88. P. reclinatum, Vill. Hist Pl. Dauph. ii. 64. P. tejucense, Nees ex Trin. Gram. Panir. 166. P. virescens, Salzm. ex Doell in Mart. Fl. Bras. ii. II, 157. P. viride, Lunn.

Syst. Ed. x. 870; Trin. Sp. Gram. Ic. t. 203. Pennisetum viride, Br. Prodr. 195.

TEMPERATE HIMALAYA and WESTERN TIBET, ascending to 11,000 ft., but not common; rare on the plains of India. NILGHIRI HILLS? (perhaps introduced) Heyne (in Herb. Wallich. n. 8640 D.) .- DISTRIB. Temp. and subtrop. regions of the Old World.

Annual. Habit of S. glauca, but spike-like panicle more interrupted; bristles of involucel 3-6, usually short, green or reddish; spikelets larger and more ovoid, and gl. IV nearly smooth.  $Gl. \ I = about-1 \ III$ , acute; II and III subequal, 5-7nerved.

6. S. gracillima, Hook. f.; leaves long narrow pubescent, peduncles elongate filiform scaberulous, spike-like panicle elongate rachis capillary villous or pubescent, spikelets minute solitary or in distant shortly pedicelled clusters of 2-3, bristles 1-2 capillary most minutely scaberulous. gl. IV transversely rugulose.

CEYLON, Gardner (n. 968).

Whole plant 18 in. high, flaccid, very slender; stems densely tufted. Leaves 8-12 by  $\frac{1}{6}$  in., finely acuminate, pubescent on both surfaces, base narrow; sheath narrow, mouth villous. Peduncles 3-4 in , quite erect, rachis hardly flexuous, pedicels pubescent, bristles erect, often solitary. Spikelets subglobose, glabrous, green; gl. I = ½ III, broadly ovate, 3-nerved; II shorter than IV, 5-7-nerved; III as long as IV, subacute, 5-nerved, palea large hyaline; IV pale, coriaceous, acute.—Quite unlike any other species.

7. S. Forbesiana, Hook. f.; perennial, tall, erect, leaves linearlanceolate base rounded, panicle narrowly pyramidal, branches short or elongate, bristles few very rigid, spikelets ovoid, glumes strongly nerved, IV minutely transversely rugulose. Setaria macrostachya, Duthie Grass. N.W. Ind. 9; Lisboa in Journ Bomb. Nat. Hist. Soc. v. (1890) 2; Herb. Ind. Or. Hook. f. & Thoms. (vix H. B. & K.). Panicum Forbesianum, Nees ex Steud. Syn. Gram. 98; Anderss. in Walp. Ann. vi. 948.—Panicum, Wall. Cat. n. 8704.

TEMPEBATE HIMALAYA; from Nepal, Wallich, to Mishmi, Grafith, ascending to 5000 ft. Khasia Hills, alt. 2-4000 ft. The Concan, Lisboa.

Stems 3-5 ft., tufted, as thick as a duck's quill, quite smooth. Leaves 12-18 by 1-3 in., finely acuminate, flat, nearly smooth except the margins; sheath glabrous or margins and mouth villous; ligule of long silky hairs. Panicle 5-12 in., strict, rachis stout, either narrowly pyramidal with erecto-patent lower branches 1-14 in. long, or spiciform with short branches. Involucel of few green or purple stout bristles,  $\frac{1}{2}$  in long or less. Spikelets  $\frac{1}{10}$  - $\frac{1}{8}$  in., sessile, ovoid, green; gl. I =  $\frac{1}{4}$  III, acute or obtuse, 3-nerved; II shorter than IV, orbicular, subacute or obtuse, 9nerved; III = IV, 7-9-nerved, paleate, male or neuter; IV oblong-ovoid, snbacute turgid, white.—Very near Setaria macrostachya, H. B. & K. of tropical America and Australia, which differs more in habit than any other characters, having a much denser panicle and the leaves very much narrowed at the base. Both are closely allied to Panicum plicatum, but the leaves are not plicate.

#### UNDETERMINABLE, &c., SPECIES.

- S. ? CANESCENS, Kunth Rev. Gram. i. 47, Enum. i. 157 = Panicum canescens, Roth Nov. Sp. 54; Steud. Syn. Gram. 54.
  - S. FIELDINGII, C. Muell. in Bot. Zeit. xix. (1861) 323. Not an Indian grass.
- S. HIRTA, Kunth Rev. Gram. & Enum. U. c.c. = Panicum hirtum, Roth I. c. 46. P. Rothii, Spreng. Syst. i. 310. Oplismenus? hirtus, Roem. & Sch. Syst. 11. 485. Echinochloa? hirta, Schult. Mant. ii. 270.

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S LUXURIANS, Willd. Herb. ex Spreng. Syst. i. 305; Kunth Enum. i. 156 = Panicum Willdenowii, Steud. nom. Ed. II. ii. 265, Syn. Gram. 54.

S. ASPERA, Mig. Fl. Ind. Bat. iii. 469.

### 14. PENNISETUM, Pers.

Annual or perennial grasses. Infl. of involucellate spikelets articulate (in Indian species) on the rachis of a simple spike; involucels of unequal scabrid or plumose filiform simple or branched bristles. Spikelets 1-3 in each involucel, sessile or very shortly pedicelled, inarticulate at the base and persistent, 1-2-fid., ovoid, glabrous or sparsely hairy. Glumes 3-4, I-III hyaline; I smallest or 0, II and III 5-nerved, subequal or II shortest, rarely absent, III paleate or not, male or neuter; IV coriaceous, bisexual or fem., articulate at the base and deciduous. Stamens 3, anthers long. Styles long, free or connate below. Grain free within the gl., oblong, orbicular or pyriform.—Species probably 30-40 of all warm countries.

The synonomy of the species is almost inextricable, and as here given for the Indian species is open to correction in some cases. Dr. Stapf has kindly revised them with me.

Sect. I. Penicillabia. Anther-cells with bearded tips. Styles connate.

P. TYPHOIDEUM, Rich. in Pers. Syn. i. 72; Del. Fl. Ægypt. 17, t. 8, f. 3; Trin. Diss. ii. 71 (typhoides); Boiss. Fl Orient. v. 447; Trim. Cat. Ceyl. Pl 106, Duthie Grass. N.W. Ind. 11, Field & Gard. Crops, 30, t. 71, Fodd. Grass. N. Ind. 18; Lisboa, in Journ Bomb. Nat. Hist Soc. v. (1891) 339. P. alopecuroides, Spreng. Syst. i. 303 (in part). P. cereale, Trin. in Mem. Acad. Petersb. Ser. vi. iii. II (1835) 185. P. cylindricum, Sw. ex Trin. Diss. ii. 70. P. giganteum, Tenore ex Steud. Nom. Ed. II. 11. 297. P. Linnaei, Kunth Revis. Gram. i. 49. P. megastachyum, Steud. Syn. Gram. 108. P. spicatum, Roem. & Sch. Syst. ii. 499. P. violaceum, Rich. in Pers Syn 1. 72. Penicillaria alopecuroides, Sweet Hort. Brit. Ed. I. 440; A. Braun Ind. Sem Hort. Berol. (1855), App. 25. Penic. ciliata, Willd. Enum. Hort. Berol 1037. Penic. chinensis, Nees ex A. Br. l. c. 26. Penic. cylindrica, Roem & Sch. l. c. 498 (non Nees). Penic. fallax, Fig. & Not. in Mem. Acad. Tor. II, xii. (1852) 371. Penic. involucrata, Schult. Mant. ii. 283; Schlecht in Linnæa, xxv. (1852), 565. Penic. nigritarum & Sieberiana, Schlecht. l. c. 561, 565. Penic. Plukeneti, Link Enum. Hort. Berol. i. 221; Nees Fl. Afr. Austr. 72. Penic. Roxburghii, A. Br. & Bouché Ind. Sem. Hort. Berol. I. c. 26. Penic. typhoidea & Raddiana, Fig. & Not. 1 c. 371, 373. Penic. solitaria, Stokes Bot Mat. Med. i. 129. Penic. spicata, Willd. l. c.; Beauv. Agrost. 58, t. 13, f. 4; Wall. Cat. n. 8644; Anderss. in Walp. Ann. vi. 966; Kunth Enum. Pl. i. 165, Suppl. 120, t. 11, f. 1; Jacq. Eclog. Gram. t. 17; Astchis. Cat. Panyab. Pl 163. Panicum spicatum, Roxb. Fl. Ind i. 283. Pan. americanum, Linn. Sp. Pl. 56. Cenchrus alopecuroides, Thunb. Prodr. Fl. Cap. 24 C paniceus, Heyne ex Wall. Cat. n. 8650. C. spicatus, Cav. Descr. 304, 614. Holcus panicitormis, Roxb. Ic. ined. n. 896. H. racemosus, Forsk. Fl. Æg. Arab. 175. H spicatus, Linn. Syst. Ed. x. 1305; Grah. Cat. Bomb. Pl. 238; Dalz. & Gibs. Bomb. Fl. Suppl. 99. Alopecurus indicus, Linn. Syst. Ed Murray 92 (excl. Syn. Pluk). A typhoides, Burm. f. Fl. Ind. 27.—Penicillaria, Wall. Cat. n. 8644, 8650.

Throughout the hotter parts of INDIA, cultivated or an escape; also all Africa and S. Europe.

Annual. Stem 3-6 ft., erect. simple, or branched from the root, slender or stout, sometimes as thick as the middle finger at the base, solid, leafy, upper nodes glabrous or woolly, lower rooting. Leaves 1-3 ft. by 1-2 in., lanceolate, spreading and drooping, flat, more or less hairy; midnib stout or slender; sheath rather inflated; ligule of hairs. Peduncle more or less woolly below the spike. Spike 6-12 in. by \(\frac{1}{2}\) in. diam, erect, cylindric, dense-fld; rachis hairy or woolly, branchlets I-8-fld., concealed by the denselv packed spikelets; bristles of involucel more or less unilateral, as long as the spikelets or longer, scabrid and ciliate, white or colrd. Spikelets 1-1 in., usually solitary in the involucel, oblong ovate or ovatelanceolate, pedicelled, pedicel ciliate; gl. I minute or 0, 1-orbicular or subquadrate, 1-3-nerved; II very variable in length, sometimes absent, usually 1-1 IV. subquadrate, truncate, obtuse or retuse 3-nerved, very rurely as long as IV and coriaceous; III ovate-oblong, obtuse or truncate and apiculate, 5-nerved, epaleate or paleate, and male or neuter, rarely bisexual; IV coriaceous or herbaceous, ovate, scute, 5-7-nerved; palea very broad, truncate, clinte at the tip and dorsally, nerves 2 approximate excurrent. Lodicules 0. Anthers linear. Grain oblong. obovoid, or pyriform, smooth, free, and top exposed.—Only known in cultivation or as an escape, and it is difficult to say whether the many known forms originated in one or more species. Alph. De Candolle unfortunately does not include it in his "Ongine des Plantes Cultivées." Its abundance throughout Africa would point to that continent as its source. There are very great differences in the number, sizes, and shapes of the glumes, of I and II especially, which are not unfrequently both absent. The materials are not sufficient to enable me to attempt a classification of the numerous forms cultivated or growing as escapes in India. To do this would require an exhaustive examination of the African forms, of which there are legions. I can only refer to Schlechtendahl's paper in the Linuwa, xxv. (1852) 530, to Kornicke & Werner's Handb. der Getreidebaues (i. 291), and to Braun's descriptions of 22 cultivated forms, chiefly African, in Walp. Ann. vi. 961. Roxburgh alludes to five varieties as cultivated in India, but does not distinguish them. The following five are selected as noteworthy.

1. Tall, very stout, leaves broad, spike very stout (Typha-like), 8-12 by 1-1½ in. diam., involucels on long ciliate pedicels with sometimes a superposed one, bristles much longer than the spikelets, dark brown; spikelets clustered in the involucels or chiefly in the upper involucel if present, ovoid or oblong, gl. I minute semilunar or 0, II 0 or like I or larger and quadrate truncate 3-lobed 3-nerved, III = IV 5-nerved, paleate, palea very broad quadrate entire or 2-fid. 2-nerved dorsally villous, IV 7-nerved emarginate apiculate, palea as in III.—The largest cult. form. Wall. Cat. n. 8644.

2. Spike cylindric 7 by  $\frac{3}{2}$  in., involucels shortly pedicelled, bristles shorter than the spikelet pale, spikelets 1-3  $\frac{1}{10}$  in., gl. I and II minute semilunar, III broadly oblong paleate and 3-nerved, palea dorsally villous, IV 7-nerved nerves and margins ciliate,

palea as in III .- N.W. India, Royle.

3. Tall, erect, spike 4-5 in., stem densely villous towards the top, involucels shortly pedicelled, bristles longer than the spikelets pale or purplish, spikelets subsolitary  $\frac{1}{6}$  in. elliptic-lanceolate, gls. 3, I 0, II =  $\frac{1}{2} \cdot \frac{3}{3}$  IV oblong truncate 5-nerved paleate, III ovate cuspidate 5-nerved.—A very common cult. form. Lahore, Stewart.—Alopecurus indicus, Hb. Heyne.

4. Stem slender 12-18 in., leaves very narrow, spike 1 in. rather slender, involucels shortly pedicelled, bristles longer than the spikelet, pale, spikelets subsolitary ovate, gls. 3, I minute semilunar, II = \frac{1}{2} III subquadrate 3-nerved, III ovate tip truncate and mucronate strongly 5-nerved, nerves and tip ciliate.—

Monghyr.

5. Spike 4-7 in., involucels shortly pedicelled, bristles much longer than the spikelets very pale, spikelets \(\frac{1}{2}\) in. narrowly lanceolate, glumes 3 all membranous, I minute, II = \(\frac{1}{2}\) III oblong truncate 3-nerved, III elliptic-lanceolate strongly 3-nerved tip emarginate mucronate, palea narrow oblong-lanceolate smooth, anther cells most minutely bearded, ovary produced into a flexuous compressed twisted

awn an inch long. Penicillaria cylindrica, R. & S; Wight Cat. n. 1662.—A diseased form.

Sect II. Pennisetum proper. Anther-cells not bearded.

- \* Bristles of involucel all free to the base, slender.
- + Bristles branched.
- 1. **P. lanatum**, Klotzsch in Bot. Erg. Waldem. Reise, 65, t. 93. P. sericeum, Munro mss. P. nepalense, Griseb. in Goett. Nachr. (1868) 302 (non Spreng.)

WESTERN HIMALAYA, alt. 7-9000 ft.; from Kashmir to Garwhal, and Westeen

TIBET, Jacquemont, &c.

Perennial; rootstock often stout, woody, creeping and branching; stem 1-3 ft. Leaves 6-18 by  $\frac{1}{6}-\frac{1}{2}$  in, fit, glabrous hairy or silkily villous. Spikes 2-5 in.,  $\frac{1}{2}-\frac{2}{6}$  in. diam., pale green; peduncle and rachis more or less villous; involucels peducelled, densely imbricate. Spikelets  $\frac{1}{6}$  in., solitary in the involucels, rather shorter than the scabrid and sparsely ciliate branching bristles; gl. I =  $\frac{1}{2}$  III, ovate, acute; II =  $\frac{1}{2}$  IV, oblong, obtuse, 3-nerved, III and IV lanceolate, acuminate, 5-nerved.

- †† Bristles unbranched, scaberulous, not or sparingly ciliate.
- 2. P. Alopecuros, Steud. Syn. Gram. 102 (non Jacq.); peduncle and rachis of spike glabrous, spikelets  $\frac{1}{3}$  in. solitary narrowly lanceolate, gl. I minute, II =  $\frac{1}{3}$  III oblong obtuse 1-3-nerved, III lanceolate acuminate 7-11-nerved, IV subulate-lanceolate 5-nerved. Duthie Grass N.W. Ind. 10; Lisboa in Journ Bomb. Nat. Hist. Soc. v. (1890) 338. P. Hohenackeri, Horhst. ex Steud. l. c. 103. P aureum, Dalz. & Gibs. Bomb. Fl. 294; P. Link. Hort. Berol. i. 215. Gymnothrix Alopecuros, Nees in Wight Cat. n. 1663; Steud. l. c. G. cenchroides, Roem. & Sch. Syst. ii. 499; Kunth Enum. Pl. i. 155; Wight ex Steud Syn. Gram. 102. Cenchrus hordeiformis, Herb. Rottl. ex Steud. l. c. 102 (non Thunb.). Panicum helvolum, Herb. Madr. ex Wall. Cat. n. 8652 A. Pan. hordeiforme, Thunb. Fl. Japon. 46 (partly). —Gymnothrix? Wall. Cat. n. 8652.

RAJPUTANA; swamps on Mt. Abu, Duthie. The Concan, Stocks, &c. NILGHIRI HILLS, alt. 5500 ft.

Perennial. Stems 2-3 ft., stout, erect, densely tufted below, subdistichously branching upwards; branches strict, erect. Leaves 12-18 by  $\frac{1}{10}$ - $\frac{1}{6}$  in., coriaceous, convolute, glabrous, base and flattened distributes sheath often villous; ligule of hairs. Spikes 5-7 in., usually pale green; rachis flexuous; involucels very shortly pedicelled; bristles few, very unequal, nearly straight, longest 2-3 times as long as the spikelet, bases quite free; gl. I suborbicular.—Habit of P. compressum. The P. aureum of the Bombay Flora is, I do not doubt, P. Alopecuros, but what P. aureum of Link may be is uncertain.

3. **P. flaccidum**, Griseb. in Goett. Nachr. (1868) 86; peduncle and rachis of spike glabrous, spikelets  $\frac{1}{8}$  in. solitary ovate-lanceolate, gl. I very small orbicular or 0, II =  $\frac{3}{8}$  IV lanceolate 5-nerved, III and IV ovate-lanceolate subsetaceously acuminate 5-nerved. Duthie Grass. N. W. Ind. 10. P. mongolicum, Franch. mss. Gymnothrix flaccida, Munro ex Aitchis. Catz Panjab. Pl. 163.

Temperate and alpine HIMALAYA, alt. 5-11,000 ft.; from Kashmir to W. Nepal

and WESTERN TIBET .- DISTRIB. Affghan., Central Asia.

Perennial. Stem 6-24 in., densely tufted, creeping below, branching at the base only, slender above. Leaves 5-10 by  $\frac{1}{6}-\frac{1}{4}$  in., flat, glabrous or sparsely harry, base

contracted, mouth of the often ciliate sheath bearded. Spikes 2-6 in., rather slender, very pale, often flexuous; involucels subsessile; bristles nearly straight or flexuous, one often very much the longest, all free to the base.

4. P. compressum, Br. Prodr. 193; tip of peduncle and rachis of spike more or less villous, spikelets 1/4 in. solitary lanceolate, gl. I minute or 0, II =  $\frac{1}{3} - \frac{1}{3}$  III ovate-lanceolate acute or obtuse 1-nerved, III ovate acuminate 5-7-nerved epaleate, IV = III 5-nerved. Schrad. in Linnaa, xii. (1838) 431; Benth. Fl. Austral. vii. 495; Steud. Syn. Gram. 102. P. alopecuroides, Spreng. Syst. i. 303 (in part). P. chinense, Steud L.c. 108. P. cynosuroides, Wall. Cat. n. 8653. P. hordeiforme, Spreng Syst. i. 302. P. nigricans, Trin. ex Steud. Nom. Ed. II. ii. 297, Syn. Gram. 103. P. japonicum, Trin in Spreng. Neue Entdeck, ii. 76, Diss. 11. 63, Pan. Gen. 88, Sp. Gram. Ic. t. 19, Franch. et Savat. Enum Pl. Jap. ii. 164 Penicillaria chinensis, Nees ex Steud. l. c. Gymnothrix compressa, Brongn. Voy. Coq Bot. 103. P.G. cenchroides, Roem. & Sch i. 499 (in part). G. hordeiformis, Nees in Linnæa, vii. (1832) 276. G. japonica, Kunth Enum. Pl. 1. 158. G. nigricans, Presl Rel. Haenk. i. 315. G. purpurascens, Sw. ex Trin. Diss. ii. 64, Pan. Gen. l. c. ? Cenchrus horderformis, Thunb. Prodr. Pl. Cap. 24. C. purpurascens, Thunb. in Trans Linn. Soc. ii. (1794) 329. Setaria compressa, Kunth Revis. Gram. 46, Enum. i. 150. Panicum alopecuroides, Linn. Sp Pl 55. P. aristidoides, Willd ex Spreng. Syst. i. 302. Pan. asperum, Link. Enum. Hort. Berol. 1. 75 (non Sch. ?). Pan. hordeiforme, Thunb. Fl. Jap 46, t. 9 (excl. cit. Afr.). ? Alopecurus horderformis, Linn. Sp. Pl. 60.—Gymnothrix, Wall. Cat. n. 8653.

BURMA; Taong Dong, Wallich; Shan Hills, alt. 4000 ft., Manders.—DISTRIB.

China, Japan, Toukin, Australia.

Perennial; stem 1-2 ft., densely tufted. Leaves 12-18 in., very narrow, convolute, silkily villous towards the base; sheath glabrous or ciliate; ligule obscure. Spikes 2-4 in., purplish in Indian specimens; involucels pedicelled, pedicels villous; bristles few, very unequal, one or two much longer than the rest and an inch long all free at the base.—Trinius refers to P. compressum, the Alopecurus hordesforms, Liun. (Cenchrus hordesforms, Thunb., Gymnothriw cenchroides, R. & S.), which appear to me to be more probably P. Alopecurus.

5. P. dichotomum, Delile Fl. Ægypt. 159, t. 8, f. 1; stem dichotomously branched rigid, peduncle and rachis glabrous, spikelets \(\frac{1}{3}\) in usually solitary lanceolate, gl. I = \(\frac{2}{3}\) III ovate-lanceolate acuminate 5-7-nerved, III = IV both 5-nerved. Trin. Diss. ii. 66, Pan. Gen. 94; Kunth Enum. Pl. i. 161, Suppl. 110; Steud. Syn. Gram. 105; Boiss. Fl. Orient. v. 444; Aitchis. Cat. Panjab. Pl. 162; Duthie Grass. N.W. Ind. 10. P. phalaroides, Schult. Mant. ii. 147; Nees Agrost. Bras. 283. Gymnothrix longiglumis, Muuro in Cat. Griff. &c. Pl. 56 (name). Cenchrus ramosissimus, Poir. Encycl. vi. 51; Dalz. & Gibs. Bomb. Fl. 294. Phalaris setacea, Forsk. Fl. Ægypt. Arab. 20. Panicum dichotomum, Forsk. l. c.; Steud. l. c. 105.

PANJAB and the N.W. PROVINCES (fid. Duthe). PESHAWUB, Aitchison. SIND and GUZERAT; on sand hills, Stocks.—DISTRIB. Affghan, and westwards to N. Africa.

Perennial, quite glabrous, bushy. Stems distantly branched; internodes long, rigid, polished; branches sometimes fascicled. Leaves short, rigid, convolute. Spikes 3-5 in., cylindric, pule, nearly white; rachis scabrid; bristles of sessile involucel, very many, slender, flexuous, pale, the longer nearly twice as long as the spikelet, inner stouter somewhat plumose, all free at the base.—I have seen no specimens from the Panjab or the N.W. Provinces.

6. P. parviflorum, Trin. Diss. ii. 65, Sp. Gram. Ic. t. 288; annual, erect, peduncle and rachis glabrous, spike very narrow purple, spikelets in solitary narrowly lanceolate, gl. I minute suborbicular, II longest truncate cuspidate 5-nerved, III = \frac{1}{4} II truncate toothed 5-nerved paleate male, IV = III lanceolate obtuse nerveless shining. Steud. Syn. Gram. 103. P. imberbe, Edgew in Journ. Linn. Soc. xxi. (1852) 181 (name); Steud. Syn. Gram 104; Duthie Grass. N.W. Ind. 10, Indig. Fodd. Grass. t. 50, Fodd. Grass. N. Ind. 18. Gymnothrix hordeoides, Kunth Revis. Gram. i. 48, Enum. i. 60. Panicum hordeoides, Poir. in Lam. Illust. i. 170. Alopecurus rubicundus, Herb. Ham. ex Wall. Cat. n. 8646 B.

RAJPUTANA; at Oodeypore, Wingate (Herb Duthie). Behar, on Parusnath,

and at Hazaribag'i, Carhe - DISTRIB tropical Africa.

Stem 2-3 ft, brunching upwards, leafy, branches erect. Leaves 4-10 by  $\frac{1}{3} - \frac{1}{3}$  in., flat, base and mouth of sheath ciliate. Spikes 3-5 by  $\frac{1}{4} - \frac{1}{3}$  in. diam.; richis very slender, strict, as it were crenate from the projections between the close-set spikelets; bristles of sessile involucel very slender, quite free, a few 4-6 times as long as the spikelet—Closely allied to P. setosa. Probably not indigenous in India.

- †† Bristles unbranched, inner copiously ciliate or lanate.
- 7. **P. orientale,** Rich in Pers Syn. i. 72; perennial, rachis of spike hairy, spikelets 2-5 in each pedicelled involucel  $\frac{1}{6}$  in lanceolate, gl. I = III ovate or oblong nerveless, II shorter than IV ovate-lanceolate acuminate 3-nerved, III longest aristately acuminate 5-nerved, IV oblong-lanceolate axistate shining. Trin Diss. ii. 69; Kunth Enum. Pl. i 162, ii. 117; Griseb. in Ledeb. Fl Ross 1v. 472; Coss & Dur. Fl. Alger. ii. 39; Boiss. Fl. Orient. v. 445; Duthie Grass. N.W. Ind. 10 P araneosum, Edgew. in Journ. Beng. As. Soc. xxi. (1852), 180; Steud. Syn Gram. 105; Artchis. Cat. Panjab Pl. 162; Duthie Grass. N.W Ind. 10. P. asperifolium, Kunth Revis. Gram. 1 49, Enum. Pl. l.c. P. elatum, Hochst. ex Steud. Nom. Ed. II. in 297. P. fasciculatum, Trin. in Mem. Acad. Petersb. Ser. 6, iii. 1I. (1835) 181. P. Griffithii, Munro Cat. Pl. Griff &c. ined. 56. P. macrostachyum, Fresen. in Mus. Senkenb. ii. 135 (non Trin.). P. persicum, Boiss. & Buhse in Nov. Mem. Soc. Nat Mosc. xii. (1860) 232. P. phalariforme, Steud. Syn. Gram. 106 (ex descript.). P. Ruppellii, Steud. Nom. l.c. 298. P. smalcum, Decne in Ann. Sc. Nat. Ser. 2, ii (1834) 11; Artchis l. c. Duthie l.c. P. tenue & variable, Fig & Notar. in Mem. Accad. Torin Ser. 2, xii. (1852), 246, 248. P. tiberiadis, Boiss. Diagn. Ser. I. xiii. 43. Cenchrus asperifolius, Desf. Fl. Atlant. ii. 388. C. hordeiformis, Pers. l. c. 71 (non Lamk). C. orientalis, Willd. ex Trin. Diss. ii. 69; Kunth l.c. 162. Panicum orientale, Willd. Enum. Hort. Berol. ii. 1031.

WESTERN HIMALAYA, from Kashmir to Kumaon, alt. 3-6000 ft. The PANJAB, SINDH, the CONCAN and BEHAR (on Parusnath, alt. 2000 ft., Clarke).—DISTRIB. Westward to Asia Minor and N. Afr.

Stem 2-6 ft., erect or ascending from a densely tufted often stout creeping branching rootstock. Leaves 1-2 ft. by  $\frac{1}{6}-\frac{1}{2}$  in , narrowly linear, flat or subconvolute, glabrous or hairy. Spike 5-16 in.; rachis stout, subterete, not grooved or notched; pedicels of involucels hispid; bristles  $\frac{2}{3}-\frac{3}{4}$  in., all very slender, flexuous, often purplish, very unequal, villous below, quite free at the base; spikelets on the short branches of a hispid pedicel, outer often imperfect.

Var. triflorum, Stapf mss.; spike elongate dense-flowered. P. triflorum, Nees

in Herb. Koyle; Steud. l. c. 107.

8. P. pedicellatum, Trin. in Mem. Acad. Petersb. Ser. vi. iii.

II. (1835) 184; annual, spikes dense-fid., rachis glabrous, spikelets in. solitary or geminate shortly pedicelled in the sessile involucels, bristles densely villous, gl. I very small oblong woolly, II broadly oblong apiculate 7-nerved, III = IV truncate 5-nerved tip toothed, IV lanceolate acute smooth shining. P. lanuginosum, Hochst. in Flora xxv. (1842), Beibl. i. 133; A. Rich. Tent. Fl. Abyss. ii. 385; Steud. Syn. Gram. 107; Lisboa in Journ. Bomb. Nat. Hist Soc. v. (1891) 339. P. amoenum, A. Rich. l. c. 386. P. lanatum, Herb. Ham. ex Wall. Cat. n. 8647. P. implicatum, Steud. l.c. 107 (ex descr.). P. intertextum, Schlecht. in Bot. Zeit. ix. (1851) 878. Eriochaeta densiflora, nervosa & secundiflora, Fig. et De Not. in Mem. Acc. Torin. Ser. II. xiv. (1854) 375-378.—Pennisetum, Wall. Cat. l. c.

RAJPOOTANA and BANDA; on Mt. Abu, Duthie. BEHAR, at Monghyr, Hamilton; Hazaribagh and on Parusnath, Clarke.—Distrib. Atr. trop.

Stems 1-3 ft, branched from the base and above, leafy. Leaves 6-10 by  $\frac{1}{0}$ - $\frac{1}{3}$  in., flat, flaced, glabrous or sparsely hairy. Spikes 2-5 in.; ruchs notched; involucels quite sessile; outer bristles short, inner  $\frac{1}{3}$  in. long, densely villous below the middle, flexuous, very unequal, pale. Spikelets with the pedicel and often the base of the lower glumes woolly; tip of gl. IV hispid.

9. P. setosum, Rich. in Pers. Syn. ii. 729 (excl. syn.); annual, peduncle and rachis of spike glabrous, spikelets 10 in. solitary in the sessile involucels, bristles 1 1 m. sparsely ciliate, gl. I minute or 0, II oblong cuspidate 5-nerved, III shorter than II oblong truncate 3-toothed 5-nerved, IV ovoid tip ciliate. Trin. Diss. ii 66, Pan. Gen. 95, Sp. Gram. Ic. t. 20, Nees in Mart. Fl. Bras. ii. II. 305; Griseb. Fl. Brit. W. Ind. 555; Baker Fl. Maurit. 441. P. barbatum, Schult. Mant. ii. 147; Nees Agrost. Bras 283, Kunth Enum. Pl. i. 163; Steud. Syn. Gram. 108. P. breve, Nees l c. 281. P. ciliatum, Parl. in Hook. Niger Flora, 184. P. ciliares, Herb. Ham. ex. Wall. Cat. n 8640 A. P. dasystachum, Desv. Opusc. (ex descr.) 76. P elegans, Nees ex Steud. l. c. 105. P. flavescens, Prest Rel. Hænk. i. 316 (ex descr). P. hirsutum, Nees Agrost. Bras. 284. P. holcoides, Schult. l c. 148; Duthie Grass. N. W. Ind. 10, Indig. Fodd. Grass. t. 49, Fodd. Grass N. Ind. 17. P. gracile, Benth. in Hook. Niger Fl. 564. P. intertextum, Herb. Ham. ex Wall. Cat. 8648. P. myurus, Parl. in Atti Riun. Ott. Sc. Ital. 586. P. pallidum, Nees Agrost. Bras. 185 (ex descr.). P. polystachyum, Schult. l. c. 146; Nees in Hook Niger Fl. 563. P. purpurascens, H.B. & K. Nov. Gen. & Sp. i. 113; Nees l. c. 282; Kunth l. c. 160. P. Richard, Kunth Revis. Gram. i. 49, 255, t. 39, Enum. 161. P. Sieberi, Kunth Revis. i. 49 (ex parte) ii. 877. P tenuispiculatum, Steud. l.c. 107 (ex descr.) P. triticoides, Roem. & Sch. Syst. ii. 877. P. uniflorum, H.B. & K. l. c. t. 34. P. violaceum, Hort. ex Trin. Diss. ii 67 (non Rich). Gymnothrix Thouari, Herb. Ham. ex Wall. Cat. n. 8645 A. (non Beauv.). Penicillaria ciliaris, Herb. Ham. l. c. n. 8646 A. Panicum Alopecuros, Lamk. Ill. i. 169; Encycl. iv. 739. Pan. barbatum, Roxb. Fl. Ind. 1. 282; Wall. Cat. n. 8646 C. Pan. cenchroides, Rich. in Act. Soc. Hist. Nat. Par. 1. (1792) 106. Pan. densispica, Poir. Encycl Suppl. iv. 273. Pan. holcoides, Roxb. l. c. 285, Ic. ined. n. 784. Pan. polystachyum, Schult. Mant. ii. 146. Pan. triticoides, Poir. l. c. 274. Setaria cenchroides, Roem. & Sch. Syst. ii. 495. Cenchrus setosus, Sw. Prodr. Veg. Ind. Occ. 26 (excl. syn.). -Penniseti sp., Wall. Cat. n. 8646, 8648.

UPPER GANGETIC PLAIN, at Cawnpore (Herb. Wight). The CIRCARS; in cultivated ground among the mts., Roxburgh. BENGAL, BRHAR, and CHOTA NAGPORE.—DISTRIB. Afric. and Amer. trop.

Stem erect, often stout and fastigiately branched at the nodes, green or purplish. Leaves 6-10 by  $\frac{1}{4}$ - $\frac{3}{4}$  in , flat, flaccid, glabrous or harry. Spikes few or many, 2-4 in., usually purplish brown; rachts slender, deeply pitted; involucels close-set, at length spreading; bristles laxly but copiously ciliate below the middle, all slender and free at the base; gl. II. suddenly or gradually cuspidate; III with two obtuse lateral teeth at the tip and an acute median. Styles free at the base.—Possibly not indigenous in India.

10. **P. borbonicum**, Kunth Revis. Gram. i. 259, t. 41, Enum. Pl. i. 162, Suppl. 118; habit, &c. of P. setosum, but spikes longer 1 in. diam. across the bristles, spikelets  $\frac{1}{6}$  in., gl. II much longer than III acuminate. Gymnothrix Thuarii, Beauv. Agrost. 59. G. Thouarii, Steud. Nom. Ed. II.; 386. Panicum longisetum, Poir. Encyc. iv. 275 (Excl. Syn. Beauv.).—Pennisetum sp. Wall. Cat. n. 8645.

BENGAL; at Serampore, Carey; margins of fields, &c., Kurz. Silhet, Griffith. —DISTEIB. Bourbon.

A very doubtful native of India.

- \*\* Inner bristles of involucel dilated below, their bases confluent in a coriaceous disk.
- 11. P. cenchroides, Rich. in Pers. Syn. i. 72; peduncle and rachis of spike glabrons, spikelets \( \frac{1}{6} \) in 1-3 in each pedicelled involucel, gl. I = \( \frac{1}{2} \) III ovate acuminate nerveless, II = \( \frac{1}{2} \) IV ovate acuminate 1-nerved, IV lanceolate truncate or cuspidate. Beauv. Agrost. 59, t. 13, f. 5; Trin. Fund. Agrost. 171, t. xv., Diss. ii. 69, Pan. Gen. 93; Nees Agrost. Bras. 184, Fl. Afr. Austr. 70, in Linnæa, vii. 162; Kunth Enum. Pl. 1. 162; Suppl. 119; Parlat. Fl. Ital. i. 108, in Webb. & Berth. Phyt. Canar iii. III. 380, t. 244; Steud. Syn Gram. 105; Boiss. Fl. Orient. v. 445; Baker Fl. Maurit. 441; Wall. Cat. n. 8649; Aitchis. Cat. Panjab. Pl. 162; Lisboa in Journ. Bomb. Nat. Hist. Soc. v. (1891) 338; Duthie Grass. N.W. Ind. 10, Indig. Fodd. Grass. t. 12, 13, Fodd. Grass. N. Ind. 17. P. ciliare, Link. Hort. Berol. i. 213; Coss. & Dur. Fl. Alger. ii. 38. P. incomptum, Nees ex Steud. l. c. 105 (ex descr.). P. distylum, Guss. Ind. Sem. Hort. Bocc. 8, Fl. Sic. Prodr. i. 12; Bertol. Fl. Ital. i. 393. P. petreum, Steud. l. c. 106. ?P. Vahlii, Kunth Revis. i. 49. P. rufescens, Spreng. Syst. i. 302; Kunth l. l. c. c. 162, ii. 117. Steud. l. c. Cenchrus Anjania, Herb. Ham. ex Wall. Cat. n. 8649 B. C. ciliaris, Linn. Sp. Pl. 302; Desf. Fl. Atlant. ii. 387. C. digynus, Schreb. ex Boiss. l. c. 449. C. longitolius, Hochst. ex Steud. l. c. C. mutabilis, Wight. Herb. C. pennisetiformis, Hochst. et Steud. ex Boiss. l. c. 448. C. rufescens, Desf. l. c. 388. Panicum vulpinum, Willd. Enum. Hort. Berol. 1031.

Plains and low hills throughout WESTERN INDIA, from Kashmir to the Upper Gangetic plain and southwd. (Absent from Ceylon.)—DISTRIB. Westwd. to Sicily, trop. Afr. and the Canaries,

Stems tufted, 6-18 in., erect or decumbent and much branched from the base, stout or slender, leafy, or ascending from a branching often nodose rootstock, the sheaths of which are often woolly. Leaves 6-10 by \(\frac{1}{6}-\frac{1}{6}\) in., glabrous hairy or villous. Spikes 1\(\frac{1}{2}-4\) in., pale, rarely purplish; peduncle often flexuous; rachis scaberulous; involucels subsessile, outer bristles slender, squarrosely spreading; inner twice as long as the spikelets, thickened and ciliate below, flitform flexuous and scabrid above. Spikelets 3, polygamous, gl. III male or sometimes fem. with an obcordate overy; IV coriaceous; styles nearly free at the base.

Var. echinoides; inner bristles of the involucel shortly connate above the basal disk. Cenchrus echinoides, Wight ex Steud. Nom. Ed. II. i. 317; Syn. Gram. 109.

- C. bulbosus, Fresen. ew Steud l. c. C. pennisetiformis, Hochst. ex Steud. l. c. 109. C setigerus, Herb. Heyne ex Wall. Cat. n. 8649 A.; Astchis. Cat. Panjab. Pl. 162. C. lappaceus, Tausch in Flora XX. (1837) 57.—The Panjab, Upper Gangetic Plain, and Deccan Peninsula, Arabia, Africa, Madeira. A nearer approach to Cenchrus than P. cenchroides, but at once distinguishable from that genus by the filiform tips of the bristles of the involucel. It occurs here and there in the same areas as P. cenchroides, and passes into it.
- 12. **P. Prieurii**, Kunth Revis. Gram. ii. 411, t. 119, Enum. Pl. i. 162, Suppl. 119; habit of P. cenckroides, but involuced nearly twice as large, the longer bristles  $\frac{3}{2}$  in. long, the spikelets one or two sessile and gl. I minute or 0. Steud. Syn. Gram. 105. Cenchrus macrostachyus, Hochst ex Steud l. c. 109.

The Panjab; Drummond (Herb. Duthie). Rajputana; at Jeypoor, Duthie.—DISTRIB. Afr. trop.

Quite glabrous. Stems tall, slender, erect, or short prostrate stout and much branched, with geniculate leafy branches Leaves 1-8 in., rigid, narrow with fliiorm tips, scaberulous; sheath inflated; ligule of very fine hairs. Spikes on long exserted or short included peduncles, 2-4 in. long, 1½ in. diam. across the bristles, very pale; rachis slender, geniculately flexuous, compressed, quite smooth; involucels subsessile; bristles 1 in. flexuous, dilated and ciliate below. Spikelets ½ in.; gl. I 0; II = III both ovate-lanceolate, cuspidately acuminate, 5-nerved; IV like III, but rather longer, 5-nerved; palea like the gl., 2-nerved. Anthers linear. Grain broadly orbicular-oblong, cuspidate, flattened.

#### DOUBTFUL SPECIES.

P. NEPALENSE, Spreng. Syst. i. 303 (to which Grisebach refers lanatum, Kl.) differs according to the description from lanatum in the coloured setæ, which are not described as branched, and in the habitat, Nepal, which is far to the east of the range of lanatum. Sprengel's specimen is in all probability from Wallich, who alone had distributed plants from Nepal at that time.

## 15. CENCHRUS, Linn.

Characters of *Pennisetum*, but involucels composed of subulate hard spines without filiform tips, connate below into a short corraceous cup, which is surrounded by erect or squarrose bristles.—Species few, tropical and subtropical.

1. C. biflorus, Roxb. Fl. Ind. i. 233; involucels rounded at the base, inner spines subulate-lanceolate erect puberulous dorsally flat with thickened margins, outer short or long erect or sub-squarrose. Kunth Enum. Pl. i. 167; Steud. Syn. Gram. 110; Wight Cat. n. 1664; Dalz. & Grbs. Bomb. Fl. 294; Aitchis. Cat. Panyab. Pl. 163 (triflorus); Duthie Grass. N.W. Ind. 9. C. bulbifer, Hochst. ex Boiss. Fl. Orient. v. 448. C. echinatus, Wall. Cat. n. 8854 B.C. C. montanus, Nees in Royle Ill. Himal. Pl. 416 (name); Steud. l.c. 111; Boiss. l.c. Aitchis. l.c.; Duthie Grass. N.W. Ind. 9, Indig. Fodd. Grass. t. 48, Fodd. Grass. N. Ind. 16. C. quinquevalvis, Herb. Ham. ex Wall. l.c. C. C. Schimperi, Hochst. ex Steud. Nom. Ed. II. i. 317. C. tripsacoides, Br. in Salt Voy. Abyss. App. 62 (nomen). C. uniflorus, Ehrb. ms. ex Boiss. l.c.

The Panjab and Upper Gangetic Plain, Royle, &c. The Concan and Scind, Stocks. Rajpootana, Duthie. Coromandel, Rowburgh, &c.—Distrib. Beluchistan, Arabia, Africa.

Annual? Stem erect, 6-24 in., simple. Leaves narrow, glabrous or hairy, mouth of sheath hairy. Spiles 2-4 in., solitary, cylindric, green; rachis flexuous,

angular, smooth; involucels loosely imbricate, spines sometimes hooked at the tip, inner  $\frac{1}{k-1}$  in. long, as long as the sessile spikelets.

2. G. catharticus, Delile Cat. Hort. Monsp. 1838, in Linnæa xiii. (1839) Litterb. 103; base of involucels turbinate or truncate, inner spines squarrosely spreading subulate dorsally deeply grooved, margins ciliate or scaberulous, outer spreading or reflexed. Steud. Syn. Gram. 130; ?Duthie Grass. N. W. Ind. 9, Indig. Fodd. Grass. t. xi., Fodd. Grass. N. Ind. 15; Boiss. Fl. Orient. v. 448. C. annularis, Anderss in Peters. Reise Mossamb. Bot. 553. C. echinatus, A. Rich. Tent. Fl. Abyss. ii. 389; Wall. Cat. n. 86.4, A.D. Aitchis. Cat. Panyab. Pl. 163; ? Duthie Grass. N. W. Ind. 9 (non Linn.). C. Lapeta, Herb. Ham. ex Wall. l.c. D. C. niloticus, Fig. & Notar. in Mem. Accad. Torin. (1854), 380. Elymus Caput Medusæ, Forsk. Fl. Æg. Arab. 25 (non Linn.).

The Panjab and Upper Gangetic Plain, Hamilton, Royle, &c.-Distrib.

Arabia, Afric. trop.

Quite glabrous. Stem geniculately ascending, branched from the base, leafy.

Leaves 1-3 in, lanceolate, finely acuminate, scaberulous; sheath inflated. Spikes
1-6 in., usually more or less enclosed in the uppermost leaf-sheath; rachis flexuous,
smooth; involucels \(\frac{1}{2}\)—\frac{1}{2} in. across the spreading spines. Spikelets \(\frac{1}{2}\) in, 1-2-fld.;
gl. I membranous; II and III hyaline, ovate, acuminate, 5-nerved; IV ovatelanceolate, cuspidately acuminate.—Resembles Pennisetum cenchroides, but at once
recognized by the rigid involucel spines. Duthie's figures under the names of
catharticus and montanus are not recognizable. The widely distributed C.

cchinatus, Linn., is very closely allied, but should be recognized by the broader
spines of the involucel. I doubt its being distinct.

## 16. STENOTAPHRUM, Trin.

Coarse grasses. Stem flattened. Leaves distichous. Spikelets spicate, partially sunk in one face of a broad flat herbaceous rachis, usually biseriate, ovate, acuminate, 1-fld., dorsally flattened, sometimes on short flat appressed branches of the rachis; rachis simple or jointed, tip acute. Glumes 4; I short, broad, rarely 0; II convex, empty; III as long as II, flat, paleate, empty or triandrous; IV equalling III, coriaceous, bisexual; palea large, ovate, acute, coriaceous. Anthers linear. Styles free. Grain broad, flattened, free within the hardened glume and pale.—Species 2 or 3 tropical.

1. S. glabrum, Trin. Fund. Agrost. 176, Gram. Panc. 60; gl. I very short truncate membranous nerveless. Nees Agrost. Bras. 92; Doell in Mart. Fl. Bras. ii II. 301, t. 39. S. americanum, Schrank Pl. Rar. Hort. Monac. 98, t. 98, in Flora, vii. (1824) Beib. 27, 28; Kunth Enum. Pl. i. 138; Benth. Fl. Austral vii. 501; Griseb. Fl. Brit W. Ind. 544. S. complanatum, Schrank in Flora l. c. 26; Kunth Enum. l. c. 137; Nees l. c. 93; Thwaites Enum. Pl Zeyl. 361; Trim. Cat. Ceyl. Pl. 106; Baker Fl. Maurit. 440. S. dimidiatum, Brong. Bot. Voy. Coq. 127; Wight Cat. n. 1606. S. glabrum, Trin. l. c. 175; Nees l. c. S. Koenigii, Schrank l. c. S. madagascariense, Kunth Revis. Gram. ii. 163, t. 211; Enum. Pl. i. 524, Suppl. 99; Steud. l. c. 118. S. sarmentosum, Nees in Mart. Fl. Bras. ii. 93; Fl. Afr. Austr. 63 S. Swartzianum, Nees Fl Afr Austr. 62. Rottboellia complanata, Sw. in Ges. Fr. Naturf. Berl. Mag. 17. (1810) 89, t. 5; Schrank l. c. R. compressa, Beauv. Agrost. 109, t. 21, f. 8.

R. dimidiata, Thunb. Prodr. Fl. Cap. 23. R. paleacea, Steud. ex Doell in Mart. Fl. Bras. ii. II. 301. R. tripsacoides, Lamk. Illustr. i. 205, t. 48, f. 1. Panieum dimidiatum, Linn. Syst. Ed. xiii. 90; Willd. Sp. Pl. i. 339; Retz. Obs. vi.; Roxb. Fl. Ind. 1. 287. P. poœforme, Bojer Hort Maurit. 365. Diastemanthe platystachys, Steud. l. c. 360. Ischemum secundatum, Wall. Fl. Carol. 249.—Stenotaphrum, Wall. Cat. 8673.

PLAINS throughout INDIA. - DISTRIB. Tropics generally.

Stem stout, creeping below; branches 2 in. to 2 ft. high. Leaves 3-6 in. by \(\frac{1}{2}\) in. broad or less; sheath broad, flat; ligule a ring of fine hairs. Spike erect, 2-4 by \(\frac{1}{2}\)-\(\frac{1}{2}\) in., not or obscurely jointed; branches when present \(\frac{3}{2}\) in. by \(\frac{1}{2}\) in., erect. Spikelets \(\frac{1}{2}\) in. long; gl. I about \(\frac{1}{2}\) II, obicular; II thin, ovate, acuminate, 7-nerved; III lanceolate, acuminate, margins thickened obscurely incurved.—Very variable in the number and arrangement of the spikelets.

2. S. Helferi, Munro in Cat. Pl. Griff. Falc., &c. (1865) ined.; gl. I half as long as III ovate-oblong strongly 3-5-nerved.—Panicum dimidiatum, Heyne in Herb. Rottl.

TENASSERIM, Helfer. MALAY PENINSULA; Plus river, Wray; Quedah, King's Collector; "Hengesturei, Feb. 12th, 1796," Heyne? in Herb. Rottler.—DISTRIB. Tonkin.

Stem 1-2 ft., as thick as a crow-quill or thicker, base decumbent geniculate. Leaves 6-10 by \(\frac{1}{2}\)-\frac{1}{2} in., strap-shaped, upper acuminate, lower obtuse apiculate sheath broad, flat; ligule a ring of short hairs. Raches of spikes 3-6 by \(\frac{1}{2}\)-\frac{3}{2} in., straight or flexuous, not jointed; spikes \(\frac{1}{2}\)-\frac{1}{2} in.; spikelets 3-6, imbricate, \(\frac{1}{2}\)-\frac{1}{2} in. long, ovate, acute; gl. I obtuse; II lanceolate, thin, 7-nerved; III = II, 5-nerved, paleate, male; IV chartaceous, dorsally flattened ovate, beaked, smooth.—Heyne's specimen is probably from the Malay Peninsula, from whence he received plants; it is accompanied by one of S. glabrum.

## 17. THUAREA, Pers.

A small much-branched prostrate leafy littoral grass Leaves short, flat. Spike terminal, included in a leaf-sheath; rachis flat, herbaceous, base at length accrescent and enveloping the spike. Spikelets uniseriate, jointed on one face of the rachis, 4-6 upper male, 2-fld.; 1-2 lower fem. or bisexual. Glumes 3-4; I small, hyaline, or in males 0; II empty; III and IV subequal, triandrous in the males; IV of the lower spikelets rigid, thin, bisexual, paleate. Anthers linear. Styles distinct. Grain free within the glume, but with the rest of the spikelets closely enveloped by the thick hardened base of the rachis, which forms an obconic caducous nut with a free deflexed and incurved beak.

T. sarmentosa, Pers. Syn. i. 110; Kunth Revis. Gram. i. 247, t. 35, Enum. Pl. i. 174, Suppl. 128; Beauv. Agrost. 127, t. 22, f. 9; Steud. Syn. Gram. 112; Thw. Enum. Pl. Zeyl. 363; Trim. Cat. Pl. Ceyl. 106; Benth. Fl. Hongk. 415, Fl. Austral. vii. 502. T. latifolia and media, Br. Prodr. 197; Kunth Enum. l.c. 173, 174. T. involuta, Br. l.c.; Miq. Fl. Ind. Bat. iii. 473. Ornithocephalochloa arenicola, Kurz in Trim. Journ. Bot. iv. (1875) 332, t. 171. Ischæmum involutum, Forst. Prodr. 73.

CEYLON, the LACCADIVE and NICOBAR ISLDS .- DISTRIB. Malay Islds., Mada-

gascar, Australia, Polynesia.

Leaves 1-2 in., linear-oblong, acute, glabrous or silky; sheaths broad, silky; ligule of hairs. Spikes 1-1 in. Spikelets 1 in. Glumes obtuse, ciliate, I minute; II ovate-oblong, 5-nerved; III much broader, 5-nerved; IV oblong-lanceolate, tip

ciliate. Fruit  $\frac{1}{3}$  in. long and broad, trigonously obconic or turbinate, obscurely ribbed, with a deep depression on one side of the crown.

# Tribe II. ORYZEÆ. (See p. 3.)

# 18. ORYZA, Linn.

Leafy tall grasses. Leaves long flat. Spikelets jointed on the slender branches of an elongate rarely spiciform panicle, 1-fld., oblong, laterally compressed, pedicels annular at the top. Glumes 2-3, I and II much the smallest, empty, scale or bristle-like, rarely 0; III chartaceous, obtuse acute or awned, strongly 3-5-nerved; palea as long as the gl., keeled. Lodicules 2, 2-lobed, rarely entire. Stamens 6, anthers linear. Styles short, free; stigmas laterally exserted. Grain narrow, free or adnate to the gl. and palea.—Species 5-6, tropical.

The gl. IV of most authors, is here considered to be a palea, as is indicated by the positions of the lodicules and stamens in relation to it.

1. O. Sativa, Linn. Sp. Pl. 333; ligule long 2-partite, spikelets loosely panicled \$\frac{1}{2} \display\$ in. long, gl. I and II \$\frac{1}{4} \frac{1}{3}\$ the length of III lanceolate, III hispid above dorsally spinescently ciliate, awn very long. Gertn. Fruct. ii. 5, t. 80, f. 5; Host Gram. Austr. iv. t. 325; Lamk. Encycl. t. 264; Kunth Enum. Pl. i. 7, Suppl. 4; T. Nees Gen. Fl. Germ Monocot. i. 2; Steud. Syn. Gram. 3; Roxb. Fl Ind. ii. 200; Wall. Cat. n. 8632; Griff. Notul. iii. 5, Ic. Pl. Asiat. t. 139, f. 149; Dalz. & Gibs. Bomb. Fl. Suppl. 98; Duthie Grass. N.W. Ind. 12, Field & Gard. Crops, 15, t. 4, Fodd. Grass. N. Ind. 20; Miq. Fl. Ind. Bat. iii. 368; Doell in Mart. Fl. Bras. ii. II. 7, t. 1; Benth. Fl. Austral. vii. 550. O. fatua, Koen. ex Trin. in Mem. Acad. Petersb. Ser. 6, ii. II. (1839) 177. O. rufipogon, Griff. l.l. c.c. & t. 145, f. 2, & t. 139, f. 147. O. palustris, Salisb. Prodr. 25. O. repens & palustris, Herb. Ham. ex Wall. l. c. F. ex Steud. l. c. O. segetalis, Russ. ex Wall. l. c. B. O. sorghoides, Steud. l. c.

Indigenous in marshes of Rajpootana, Sikkim, Bengal, the Khama Hills, Central India, The Ciecars and Pegu. Ceylon, Ferguson.—Distrib. Australtrop.

Annual. Stems 2-10 ft, creeping or floating. Leaves 1-2 ft. by 1-1 in. or more, flat, striated, 1-nerved, scaberulous; sheaths smooth. Panicle at length drooping. Spikelets not imbricating, awn 3-5 in. long, yellow or reddish, shining.—I have described above the plant which Roxburgh and other Indian authors consider to be the indigenous Rice, and who have collected it as such in the localities mentioned above, as I have in hot valleys of Sikkim and the Khasia Hills. It resembles in all essentials a commonly cultivated awned sort. I have seen no specimens of Griffith's O. rufpogon, which he describes as a very different-looking plant, but his characters are not diagnostic, and a memorandum by Munro (in Herb. Kew) states that he can find no real distinction for it. For the cultivated varieties of Bice in India, see Watt. "Dictionary of the Economic Products of India," vol. v.—The awnless O. denudata, Steud. Nom. Ed. I. 577 (O. mutica, Steud. l.c.; Lour. Ft. Cockinch. i. 267, O. sativa, var. submutica, Miq. Ft. Ind. Bat. iii. 369), is a cultivated form.

2. **O. latifolia**, Desv. Journ. Bot. i. (1813) 77; ligule very short, branches of panicle very long often whorled, spikelets subimbricate oblong beaked, gl. I and II = \frac{1}{4} \frac{1}{3} III lanceolate, III hispid finely granulate awn

as long or twice as long as the gl. Kunth Revis. Gram. i. 185, t. 4, Enum. Pl. i. 7, Suppl. 4. O. officinalis, Wall. & montana, Ham. Wall. Cat. n. 8635, 8633. O. platyphylla, Sch. f. Syst. vii. II. 1364.

Low valleys in Sikkim, Assam, Silhet, Cachab, Munnepore, Central India, and Burma.—Distrib Trop. As. Afr. and Amer.

Stems up to 6 ft, tufted, as thick as a swan's quill below. Leaves 1-2 ft. by \(\frac{1}{2}\)-1\(\frac{1}{2}\) in., nearly smooth, many-nerved; midrib slender, shining beneath; sheath very long. Branches of panicle 4-8 in., very slender; pedicels and branchlets bearded at the base. Spikelets \(\frac{1}{2}\)-\(\frac{1}{2}\) in.; gl. III and palea hairy.

Var. collina; gl. I and II minute or 0. O. sativa, Thwaites Enum. Pl. Zeyl. 357. O. sativa var. collina, Trim. mss.—Ceylon; hills about Colombo and in the

Western Provinces.

3. O. granulata, Nees et Arn. in Wight Cat. n. 2354, ex Wall. Cat. n. 8634; ligule very short, spikelets in simple racemes obtuse awnless; gl. I and II munute or O, III and palea glabrous granulate. Steud. Syn. Gram. 3. O. filiformis, Herb. Ham. ex Wall. l. c. O. triandra, Herb. Heyne ex Steud. l. c. Padia Meyeriana, Zoll. & Mor. Verz. 103; Miq. Fl. Ind. Bat. iii. 373; Steud. l. c. 3.

In dry woods; Sikkim Himalaya, the Khasia, and Behar Hills. Malabak and Maduba, Heyne, Wight, &c. Ceylon; at Rambukkana, Trimen.—Distrib. Java.

Stems 2-3 ft., slender, tufted. Leaves 3-6 by  $\frac{1}{2}$  in., thin, midrib beneath and nerves distinct; sheath very long. Racemes very slender, on very long slender peduncles; rachis flexuous, rarely with a short branch at the base. Spikelets shortly pedicelled,  $\frac{1}{6}-\frac{1}{4}$  in long.

4. **O. Ridleyi**, Hook.f; very slender, leaves thin nerves distinct, ligule long, panicle with solitary alternate branches, spikelets  $\frac{1}{3} - \frac{1}{2}$  in., gls. I and II setaceous, III thinly chartaceous scabrid narrowly oblong dorsally spinulose-cultate narrowed into an awn of about its own length.

MALAY PENINSULA; Pahang, in dense thickets, Ridley.—DISTRIB. Borneo. Stem 2-3 ft., weak, as thick as a crow's quill below. Leaves 12 by \(\frac{1}{2}\) in., nearly smooth; sheath long, slender. Panicle 12 in.; branches sometimes 6 in. and rachis very slender; pedicels \(\frac{1}{2}\) in.—Habit of O. granulata, but spikelets more

like O. coarctata.

5. O. coarctata, Roxb. Fl. Ind. ii. 206; tall, stout, leaves coriaceous caudate-acuminate spinulose-serrate nerves obscure, ligule very short, panicle spiciform, branches few-fid., spikelets \( \frac{1}{2} \) \( \frac{2}{3} \) in., gl. I and II setaceous, III narrowly dolabriform quite smooth dorsally winged tip narrowed into a short rigid awn quite smooth. Wall. Cat. n. 8646; Griff. Notul iii. 8, Ic. Pl. Asiat. t. 142, f. 1; Miq. Fl. Ind. Bat. iii. 371. O. triticoides, Griff. Notul. l. c. Sclerophyllum coarctatum, Griff. l. c.

SUNDERBUNDS, Hamilton, Rowburgh, &c. Scind, at Shikarpur (Herb. Duthie). Stem 4-6 ft., erect from a stout creeping rhizome, branching, smooth, hard, polished. Leaves 6-12 by \(\frac{1}{2}\)-\frac{1}{2}\) in., unequal-sided, rigid, smooth or scaberulous, nerves and midrib obscure, tips long slender; sheath long, undulately reticulate, polished. Pancele 4-6 in., rachis and branches trigonous, stiff, quite smooth; pedicels clavate at the top and then contracted below the dilated cupular tip. Spikelets laxly imbricate, rigidly chartaceous; gl. I and II not half as long as III, erect; III strongly laterally often obliquely compressed, keeled, keel dilated above into a rounded wing, obscurely 7-9-nerved, lateral nerves submarginal; palea chartaceous, as long as the gl., oblong-lanceolate, acuminate, plicate, 5-nerved, median

nerve faint, two intermediate very stout, lateral more slender. Lodicules large, membranous, subquadrate or trapeziform. Anthers very long and slender. Ovary narrow, elongate. Gram not seen.—A very remarkable species. In Gen. Plant (iii. 1117) this is by oversight stated to be Himalayan.

## 19. LEERSIA, Sw.

Characters of Orzya, but empty gls. 0; fl. gls. thinner not awned, keel and margin ciliate; stamens 6, 3 or fewer.—Species 7, chiefly American.

1. L. hexandra, Sw. Prodr. Veg. Ind. Occ. 21, Fl. Ind. Occ. i. 131; panicle contracted, stamens 6. Fl. Dan. t. 1744; Kunth Enum. Pl. i. 6; Host Gram. Austr. t. 35; Engl. Bot. t. 2908; Renchb. Ic. Fl. Germ. i. t. 52; T. Nees Gen. Fl. Germ. Monocot. i. n. 1; Wall. Cat. n. 8637; Thw. Enum. 356; Trim. Cat. Ceyl. Pl. 106; Duthie Grass. N.W. Ind. 12; Mig. Fl. Ind. Bat. iii. 367; Benth. Fl. Austral. vin. 549. L. australis, Br. Frodr. 210; Kunth l. c. 6. L. ciliata, Roxb. Fl. Ind. ii. 207; Astchis. Cat. Panjab. Pl. 157; Duthie l. c., Fodd. Grass. N. Ind. 21. L. ciliaris, Griff. Notul. iii. 2. L. glaberrima, Trin. Oryz. 7; Miquel l c. 368. L. mexicana, H. B. & K. Nov. Gen. & Sp. i. 195; Kunth l. c. 6, & ii. 2, Suppl. 2; Revis. Gram. 178, t. 1. Zizania ciliata, Spreng. Syst ii. 136; Kunth Revis. Gram. i. 8; Griff. Notul. iii. 1. Oryza ciliata, Herb. Ham. ex Wall. Cat. n. 8637 B. O. hexandra, Doell in Mart. Fl. Bras. ii. II, 10. Pharus ciliatas, Retz. Obs. v. 23. Pseudoryza ciliata, Griff. Ic. Pl. Asiat. t. 144, f. 1. Turraya napalensis, Wall. Cat. 8637 D. Blepharochloa ciliata, Endl. Gen. 1352; Steud. l. c. 4.

LOWER HIMALAYA, in marshes, from Nepal eastward to Assam and Burma, and southward to the Malay Peninsula and CEYLON.—DISTRIB. Trop. Afric., Amer., and Austral.

- Stem 2-4 ft., weak, base rooting; nodes villous. Leaves erect, 8-12 in. by  $\frac{1}{3} \frac{1}{2}$  in., flat; ligule truncate. Panicle 2-4 in., oblong, branches suberect or spreading flexuous, few-fld. Spikelets  $\frac{1}{6}$  in., dimidiate-oblong, smooth or scaberulous, pale green; keel of gl. and palea rigidly ciliate.
- 2. L. oryzoides, Sw. Prodr. Veg. Ind. Occ. 21, Fl. Ind. Occ. i. 132; panicle effuse, stamens 3. Host Gram. Austr. i. t. 35; Kunth Enum. Pl. 1. 5, Suppl. 1; Reichb. Ic. Fl. Germ. i. t. 52. Oryza clandestina, A. Br. ex. Aschers. Fl. Brandenb. 799. Asprella oryzoides, Lamk. Ill. i. 167; Roem. & Sch. Syst. ii. 266. Homalocenchrus oryzoides, Mieg. ex. Poll. Hist. Pl. Palat. i. 52. Phalaris oryzoides, Linn. Sp. Pl. 55 (excl. cit.); Schreb. Beschr. Græse, vi. t. 22.

Kashmir, Falconer, Thomson.—Distrib. Trop. and temp. regions.

Stem 2-3 ft, nodes villous. Leaves glaucous, scaberulous; sheath compressed; ligule lacerate. Paniele 3-7 in., base embraced by the upper leaf-sheath. Spikelets few, remote, \(\frac{1}{6}\) in. long.

# 20. HYGRORHIZA, Nees.

A floating glabrous grass. Leaves short, broad, flat. Spikelets few, lanceolate, 1-fld., shortly pedicelled on the few branches of a broad spreading panicle, articulate on the annulate tip of the pedicel. Glume solitary (empty gls. 0), flg. membranous, lanceolate, narrowed into a long awn, 5 nerved, keel and nerves ciliate; palea acuminate, 3-nerved, keel scabrid. Lodicules 2, gibbous. Stamens 6, anthers very long. Styles short, free, stammas

laterally exserted. Grain narrowly oblong, free within the membranous glumes.

H. aristata, Nees in Edinb. New Phil. Journ. xv. (1833) 380; Steud. Syn. Gram 5, Thu. Enum. Pl. Zeyl. 356; Trim. Cat. Ceyl. Pl. 106; Duthre Grass. N.W. Ind. 12, Fodd. Grass. N. Ind. 20; Artchison Cat. Panyab Pl. 157; Wall. Cat. n. 8638; Wight Cat. n. 1739. Leersia aristata, Roxb. Fl. Ind. ii. 207; Griff. Notul. iii. 3; Steud. l. c. Pharus aristatus, Retz. Obs. v. 23. P. natans, Herb. Russel, ex Wall. l.c. Zizania aristata, Kunth Revis. Gram. i. 8, Enum. Pl. i. 10 Z. Retzii, Spreng. Syst. ii. 136. Potamochloa Retzii, Griff. Notul. iii. 3, 8, Ic. Pl. Asiat. t. 139, f. 147, & t. 140.—Rheede Hort. Mal. x. t. 12.

Upper and Lower Gangeric Plains, Assam, Chittagong, Pegu, the Deccan and CEYLON .- DISTRIB. Tonkin.

Stem as thick as a crow-quill, 12-18 in. long, with feathery whorled roots at the nodes. Leaves 1-3 by \(\frac{1}{2}-\frac{2}{3}\) in., ovate-lanceolate to linear-oblong, scaberulous above; base and tip rounded, or tip acute and base cordate; sheath broad, inflated, compressed, mouth auricled; ligule 0. Panicle 2-3 in. long, and broad triangular, branches few, spreading, slender, lower whorled, often deflexed. Spikelets in long, pale green, pedicels articulate with a red annulus below the middle. Glume dorsally convex; palea as long, awn longer than the gl.

## 21. LEPTASPIS, Br.

Tall monocious grasses. Leaves petioled, elliptic-oblong, flat, nervules trabeculate. Pancle terminal, erect; branches whorled, long, stiff, bearing a raceme of spikelets at their tips, of which the upper are male. Spikelets not jointed on the very short pedicels. MALE, glumes 3, I and II small, ovate, empty, 5-7-nerved, spreading; III paleate, hexandrous; filaments short, anthers long. FEM. a utricle open at the top, enclosing the ovary and a linear palea, the tip of which is exserted. Lodicules small, truncate. Styles 3, very long. Grain free within the inflated accrescent utricle .-Species 3 or 4, tropical Asia, Africa, and Australia.

1. L. urceolata, Br. in Benn. Pl. Jav. Rar. 23, t. 6; leaves 7-12 in. long-petioled elliptic-lanceolate or oblanceolate, branches of panicle many stout, utricles turbinately pyriform. Wall. Cat. n. 8901; Mig. Fl. Ind. Bat. iii. 374; Steud. Syn. Gram. 8; Thw. Enum. Pl. Zeyl. 357; Trim. Cat. Ceyl. Pl. 106. L. zeylanica, Nees ex Steud. l.c. L. manillensis, Steud. l. c. Pharus urceolatus, Roxb. Fl. Ind. iii. 611.

PENANG, Roxburgh. JOHOBE, King's Collector. CEYLON, Thwaites .- DISTRIB. Java, Sumatra.

Rootstock creeping; stem 2-3 ft. Leaves subdistichous, 2-4 in. broad, abruptly acuminate; petiole 1-2 in.; sheath 3-10 in., flattened. Panicle 6-12 in. long; lower branches 6-10 in. Fem. spikelets \(\frac{1}{4}\) in. long.

2. L. cochleata, Thw. Enum. Pl. Zeyl. 357; leaves 4-10 in. shortly petioled oblong-lanceolate, branches of panicle few slender, utricles oblong incurved 5-ribbed tomentose with hooked hairs. Trim. Cat. Ceyl. Pl. 106.

CEYLON; in the Central Province, alt. 4000 ft., Thwaites.

Stems 2-3 ft. from a procumbent base. Leaves 13-13 in. broad, acuminate; petiole 1-1 in.; sheath 1-3 in. Panicle 6-8 in.; branches 3-4 in., ternately whorled. Fem. spikelets 1 in.; glumes broadly ovate, acuminate. Utricle 1 in. long. Grain not seen.

## TRIBE III. ZOYSIEÆ. (See p. 3.)

### 22. TRACHYS. Pers.

An annual diffuse softly villous grass. Spikes 2-rarely 3-nate, terminal, flattened, rigid, flexuous, jointed. Spikelets 1-fld., in alternate subsessile fascicles which are jointed on the under surface of the spikes, and are formed of 1-3 perfect sessile spikelets mixed with squarrose flowerless gls. Glumes of perfect spikelets 4, I minute, triangular, coriaceous, nerveless; II narrow, linear-lanceolate, membranous, 3-5-nerved, nerves ciliate below the middle; III much the largest, broadly obovate-oblong, cuspidately acuminate, rigidly coriaceous, 9-nerved epaleate; IV much smaller, ovate-lanceolate, cuspidately acuminate, chartaceous, 1-nerved; palea lanceolate, chartaceous, nerveless. Lodicules very minute, hyaline. Stamens 3, anthers linear. Styles long, free, stigmas long. Grain broadly oblong, compressed, free within the gl. and pale.

The above description differs from any that I have met with. Gl. III of the perfect spikelet is much larger than any of those of the imperfect spikelets, which form a squarrose tust around the perfect.

T. mucronata, Pers. Syn. i. 85; Beauv. Agrost. 107, t. 21, f. 7; Kunth Enum. Pl. 1. 168, Suppl. 123; Thv. Enum Pl. Zeyl. 362; Trim. Cat. Ceyl. Pl. 106; Miq. Fl. Ind. Bat. ii. 472; Wall. Cat. n. 8674; Wight Cat. n. 1660. T. muricata (error for mucronata), Steud. Syn Gram. 112. Cenchrus muricatus, Linn. Mant. 302; Schreb. Beschr. Graes. ii. 69, t. 34. C. tripsaceus, Herb. Linn. ex Munro in Journ. Linn. Soc. vi. (1862) 55. Trachystachys geminata, A. Dietr. Sp. Pl. ii. 16. Tripsacum distachyum, Herb. Linn. ex Munro l. c. Trachyozus muricata, Steud. l. c. 112. Panicum dimidiatum, Burm. Fl. Ind. 25, t. 8, f. 3. P. squarrosum, Retz. Obs. iv. 15, v. t. 1; Roxb. Cor. Pl. iii. 4, t. 206; Fl. Ind. i. 288.

The DECCAN PENINSULA; sandy ground near the sea; Heyne, Rowburgh, &c. CEYLON; Jaffna, Gardner.

Stems 1-2 ft., weak, geniculate, rooting at the nodes. Leaves 2-6 by \(\frac{1}{4-\frac{1}{2}}\) in., linear-lanceolate, acuminate, flaccid, rarely nearly glabrous, margins often crisped; mouth of sheath hairy; ligule obscure. Peduncle long or short. Spikes 2-3 in., sessile or shortly peduncled, costa of rachis stout, margins broad, green; joints concave subquadrate. Spikelts (perfect) \(\frac{1}{2}\) in long, sessile or very shortly stoutly pedicelled, pale, shining, terminal one on the spike solitary; gl. II very much narrower than III, and not overlapping the base of the latter or hardly, epaleate; III nearly flat, with the margins incurved; IV with the palea treete, margins strongly incurved over the palea.—The structure of gl. II is very peculiar; at first sight it may be taken for a narrow membranous palea of III, its lower insertion to which and exterior position are difficult to distinguish.

# 23. TRAGUS, Haller.

A low rigid perennial grass. Leaves small. Spikelets 1-fid., 2-5-nate in narrow spikes, not articulate on the pedicels; rachis slender. Glumes 2; I thickly coriaceous, oblong-lanceolate, 5-ribbed, ribs with long recurved spines embracing II which is chartaceous, oblong, apiculate, 1-nerved, scaberulous; palea hyaline, obtuse, involute, faintly 2-nerved below. Stamens 3, anthers very long. Styles short, distant, stigmas short. Grain linear, free within the glumes.

T. racemosus, Scop. Introd Hist Nat. 73; Desf. Fl. Atlant. ii. 386; T. Nees Gen. Fl. Germ. Monoc i. n. 25; Trimen Cat. Ceyl. Pl. 106; Duthie Grass. N.W. Ind. 13, Indig. Fodd. Grass. t. 14, Fodd. Grass. N. Ind. 22. T. muricatus, Moench Meth. 53. T. alienus, biforus, & Berteronianus, Schult. Mant. ii. 205. T. brevicaulis, Boiss. Diagn. Ser. I. xiii. 44. T. occidentalis & orientalis, Nees Agrost. Bras. 286; Doell in Mart. Fl. Bras. ii. II. 286, t. 28. T. Halleri, Doell l. c. 122. T. biforus, Nees ex Wight Cat. 1661. Lappago racemosa, Honck. Syn. Pl. Germ. i. 440; Host Gram. Austr. i. t. 36; Sibth. Fl. Gree. ii. t. 101; Kunth Enum. Pl. i. 169, Suppl. 124; Steud. Syn. Gram. 112; Reichb. Ic Fl. Germ. i. t. 30; Wall. Cat. n. 8675; Thw. Enum. Pl. Zeyl. 362; Atchis Cat. Panjab. Pl. 163; Benth. Fl. Austral. vii. 506; Miq. Fl. Ind. Bat. iii. 473. L. biflora, Roxb. Fl. Ind. i. 281; Grah. Cat. Bomb. Pl. 234. L. aliena, Spreng. Neue Entdeck. ii. 15, Syst. Pl. i 266; Steud. l. c.; Dalz & Gibs Bomb. Fl. 295. L. occidentalis, Nees in Schimp. Pl. Arab. Fel. Ed ii n. 793. Cenchrus racemosus, Linn. Sp. Pl. 1049; Schreb. Beschr. Graes. 45, t. 4. C. linearis, Lam. Fl. Franc. iii. 631. C. muricatus, Herb. Russ. ex Wall. l. c. A. Phalaris muricata, Forsk. Fl. Æg. Arab. 302. Aira malatrina, Herb. Ham. ex Wall. l. c. D.

Dry plains of India; from Kashmir to Upper Bengal, and southward to CEYLON.

BURMA, Wallich - DISTRIB. Warm regions generally.

Steins erect in the first year, 4-8 in. high, leafy nearly to the spikes, then sending from the base rooting and leafing fig. stolons all round. Leaves very variable, smooth or scaberulous, ovate and ½ in. long, or narrower and 1-1½ in. long, acuminate, margins and mouth of sheath ciliate. Spikes 1-4 in., rachis and very short pedicels pubescent. Spikelets ½-½ in., crowded, in pairs face to face, simulating one spikelet with 2 equal spinous glumes. Gl. II with broad hyaline margins towards the tip.—In all Indian specimens I find the spikelets in pairs, each with 2 gl. I have not seen the fasciled spikelets described in Gen. Plant. A small lower gl. is described as sometimes present, and 5 spikelets as occurring on a single pedicel.

## 24. LATIPES, Kunth.

A perennial rather rigid grass. Leaves subulate, convolute. Spikelets 1-fid., in simple subspictform racemes, biseriate (one usually imperfect) persistent on the flattened truncate spreading articulate pedicels; rachis flexuous. Glumes 3, I and II empty, thickly coriaceous, I usually longest, narrow, recurved, 3-nerved, subspinously pectinate, dorsally smooth; II lanceolate, spinously tubercled, embracing III (fig.), which is shorter, hyaline, oblong, acute, ciliate; palea munte, linear-oblong, nerveless. Lodicules 2, hyaline. Stamens 3, anthers oblong. Styles free. Grain free, obliquely ovate-lanceolate.

L. senegalensis, Kunth Revis. Gram. i. 261, t. 42, Enum. Pl. i. 171, Suppl. 125; Duthie Grass. N.W. Ind. 13, Fodd. Grass. N. Ind. 22. Lappago Latipes, Steud. Syn. Gram. 112. T. senegalensis, J. Gay ex Kunth Enum. l. c.

SCIND, at Kurrachee, Stocks. Beluchistan, Frere. - Distrib. Arabia, Abyssinia,

Senegal.

Stems 3-10 in. wiry, creeping with many erect or spreading branches, leafy up to the racemes. Leaves 1-3 in.; lower sheaths short, mouth hairy; ligule 0. Racemes 2-6 in.; rachis glabrous; pedicels distant, narrowly cuneiform, margins winged ciliate. Spikelets \(\frac{1}{2-\frac{1}{2}}\) in., reddish-brown.—The Indian specimens are small. The pedicels are flattened and bear normally 2 spikelets, one well developed and fertile, the other imperfect with gl. I and II narrower of equal length and irregularly spinously tubercled.

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### 25. LOPHOLEPIS. Decne.

An annual tufted erect grass. Leaves short, flat. Spikelets minute, 1-fld., jointed but persistent on the very short spreading pedicels of an elongate simple spiciform raceme, exactly like a bird's head; pedicels jointed on the rachis. Glumes 3; I incumbent, oblong, acute, strongly incurved above the base, produced above into a globose boss with a pectinate crest, and with a pectinate wing on the mesial line beyond it; II shorter, narrower, with often a dorsal pectinate wing; III flg. much shorter, hyaline, ovate, acute; palea hyaline. Lodicules quadrate. Stamens 2; anthers short, most minute. Styles short; stigmas feathery. Grain subulate, base gibbously incurved, free within the rigid glumes.

L. ornithocephala, Steud Syn. Gram. 112; Decne in Archiv. Mus. Par. i. (1839) 147; Wall. Cat. n. 8881 Holboellia ornithocephala, Wall. in Hook. Bot. Misc. ii. 144, t. 76; Wight Cat. n. 1741; Kunth Enum. Pl. i. 171.

Southern Provinces of the DECCAN PENINSULA, Madura, Tinnevelly, &c., Koenig.

&c. CEYLON; Northern Province, Trimen.

A rather stiff grass, 6-18 in. high; roots wiry. Leaves  $\frac{1}{2}-1\frac{1}{2}$  in., ovate to oblong-lanceolate, acuminate, margins chlolate; lower sheaths short; liquie 0. Racemes 2-4 in., columnar,  $\frac{1}{2}$  in. diam.; rachis slender, strict, and the horizontal rather stout grooved pedicels green and scabridly ciliate. Spikelets  $\frac{1}{16}-\frac{1}{13}$  in. long, red-brown in age, horizontal or slightly deflexed from the pedicel.—One of the most singular Indian grasses.

## 26. PEROTIS, Ait.

A slender grass, with short broad leaves and a crinite spike. Spikelets subsessile, 1-fld., jointed on a slender simple unjointed rachis, very narrow, callus conical. Glumes 3; I and II empty, subequal, narrowly linear, 1-nerved, tapering into long capillary awns; III very minute, flg.; palea hyaline. Lodicules short, hyaline. Stamens 3, anthers very short. Styles very short, united at the base, stigmas very short. Grain much longer than its glumes, narrow.

P. latifolia. Ait. Hort. Kew, i. 85; Beauv. Agrost t 4, f. 9; 6 (laxifolia), Kunth Revis. Gram i. 357, t. 92, Enum. Pl. 1. 471, Suppl 380; Steud. Syn. Gram. 186; Roxb. Fl. Ind. i. 239; Wall. Cat. n. 3783; Wyght Cat. n. 1740; Grah. Cat Bomb. Pl. 237; Dalz. & Grbs. Bomb Fl. 296; Thw. Enum. Pl. Zeyl 369; Trun. Cat. Ceyl. Pl. 106; Duthie Grass. N.W. Ind 13; Benth. Fl. Hongk 418; Miq. Fl. Ind. Bat. iii. 479. P. Burmanni, Steud. Nom. Ed. I. 605. P. cubana, Wright in Sauv. Fl. Cub. 202. P. glabrata, Steud. Syn. Gram. 186. P. hordeitormis, Nees ex Steud. Nom. Ed. II. ii. 306; Syn. Gram. l. c.; Trin. in Mem Acad Petersb. Ser. VI. vi. II. (1845) 267. P. longiflora, Nees in Hook. & Arn. Bot. Beech. Voy 247; Steud. Syn. Gram. 186. P. patula, Nees ex Steud. Nom. l. c.; Trin Fund. Agrost. ii. 266; Steud. Syn. Gram. 186. P. rara, Br. Prodr. 172; Benth. Fl. Austral. vii. 509. P. scabra, Willd. ex Trin. Diss. n. 172. P. spicæformis, Beauv. ex Steud. Nom. Ed. I. 605. Perostis laxifolia, Beauv. l. c 6. Saccharum spicatum, Linn. Sp. Pl. 54. S. brevifolium, Herb. Ham. ex Wall. l. c B. Agrostis spicæformis, Linn. f., Suppl. 108; Willd. Sp. Pl. 1 362. Anthoxanthum indicum, Linn. Sp Pl. 28. Xystidium barbatum, Presl Rel. Hænk. i. 228. X maritimum, Trin. Fund. Agrost. 102, t. 2.—Rheede Hort. Mal. xii. t. 62.

LOWER HIMALAYA, ascending to 5000 ft., from Kunawur to Sikkim. Plains of India from the Panj b to Burma and the Malay Pennsula and southwards to

CEYLON -DISTRIB. Affghan., Trop. Asia, and Africa

Stems stout and branching at the base, then ascending, 3-10 in., leafy. Leaves  $\frac{1}{2}$ -1 in., ovate or lanceolate, base condate; sheath short; ligule ciliate. Spikes 1-8 in. Spikelets  $\frac{1}{10-\frac{1}{6}}$  in., contracted into a callus above the joint. Glumes scaberulous; awn very variable in length.—Bentham is, I think, right in his suggestion that P. rara, Br., is not different from P. latifolia, and that there is but one species of Perotis, varying greatly in the size of all its parts.

## 27. ZOYSIA, Willd.

A small, much branched, rigid, glabrous grass. Leaves subulate, pungent. Spikelets small, ovoid, 1-fld., spicate, subimbricate, jointed on and appressed to a rigid notched unjointed rachis, sessile or shortly pedicelled. Glumes 2; I empty, coriaceous, laterally compressed, shining, nerveless, margins connate below, hyaline; II much smaller, membranous, linear-oblong, obtuse, complicate; palea short, nerveless, hyaline or 0. Lodicules 0. Stamens 3, anthers long. Styles very long, distinct, stigmas elongate. Grain free within the glumes.

Z. pungens, Willd. in Ges. Naturf Fr. N. Schr. iii. (1801) 441; Br. Prodr. x. 208; Kunth Enum. Pl. i. 471, Suppl. 381; Beauv. Agrost. i. t. 4, f. 1; Steud. Syn. Gram. 414; Wall. Cat. n. 3763; Wight Cat. n. 1728; Thv. Enum. Pl. Zeyl. 370; Trim. Cat. Ceyl. Pl. 106; Miq. Fl. Ind. Bat. iii. 478; Hook. f Fl New Zeal. i. 312; Benth. Fl. Austral. vii. 506; Buchanan Grasses, N. Zeal. t. 13 A.; Boker Fl. Maurit 442. Z. aristata, Browni, Griffithiana, & sedoides, C. Mwell. in Bot. Zeit. xiii. (1855) 272, 273, 274. Z. japonica, Wendl. ex Steud. l. c. 414. Z. sinica, Hance in Journ. Bot. vii. (1869) 168, & in Journ. Linn. Soc. xiii. (1873) 134. Z. setacea, Nees ex Steud. Nom. Ed. II. ii. 801. Z. tenuifolia, Trin. in Mem. Acad. Petersb. Ser. VI. iv. Sc. Nat. ii. (1836) 96. Matrella juncea, Pers. Syn. 1. 78. Panicum Crinum-ursi, Bory ex Steud. Nom. l. c. 255. Milum martimum, Koen. ex Wall. l. c. Ophiurus erectus, Herb. Wight. ex Wall. l. c. B. Agrostis Matrella, Linn. Mant. ii. 185; Roxb. Fl. Ind. i. 317.

Sandy shores of India, Malacca, and Chylon.—Distrib. Trop. Asia, Austral., and Maurit.

Rootstock rigid, wiry; branches interlaced and rooting, sending up short leafy stems, 6-10 in. high. Leaves 1-3 in., coriaceous, usually spreading, margins incurved; sheath short, mouth ciliate. Spikes 1-1½ in. Spikelets \delta-\delta

## Tribe IV. Andropogonez. (See p. 3.)

## 28. COIX, Linn.

A tall annual or perennial grass. Leaves long, broad. Spikes numerous, axillary and terminal; lower spikelets solutary, fem., enclosed in an at length hardened polished nut-like bract, through the apex of which the pedicelled male portion protrudes. Male spikelets 2-3-nate at each node of the rachis, one sessile and one or two pedicelled, lanceolate; glumes 4, I and II subequal, empty, rigid, or herbaceous; I keeled along the inflexed margins; III and IV hyaline, paleate, triandrous or empty. Fem. spikelets ovoid, acuminate; glumes 4, I chartaceous, II-IV successively

thinner; IV paleate. Staminodes minute. Lodicules 0. Ovary ovoid, styles 2, free slender. Grain orbicular, ventrally furrowed, enclosed in the hardened globose ovoid or cylindric involucre.

C. Lachryma-Jobi, Linn. Sp. Pl. 972; C Lachryma, Linn. Syst. Ed. x. 1261; Lamk. Ill. t. 750; Kunth Envin. Pl. i. 20, Suppl. 16, t. 3, 4; Beauv. Agrost. t. 24, f. 5; Bot Mag. t. 2479; Steud. Syn. Gram. 9; Webb. Phyt. Canar. t. 242, 243; Roxb. Fl. Ind. iii. 568; Grah. Cat. Bonb. Pl. 240; Wall. Cat. n. 8623; Grif. Notul. iii. 10; Thv. Enum. Pl. Zeyl. 375; Trimen Cat. Ceyl. Pl. 106; Dalz. & Gibs. Bomb. Fl. 289; Aitchis. Cat. Panjab. Pl. 157; Duthie Grass. N.W. Ind. 11, Fodd. Grass. N. Ind. 18; Miq. Fl. Ind. Bat. iii. 476, t. 41 B. C. agrestis, Lour. Fl. Cochinch. 551. C. arundinacea, Lamk Encycl. iii. 422. C. exaltata, Jacq Eclog. Gram. 6, t. 40. C. ovata, Stokes Bot. Mat. Med. iv. 342. C. pendula, Salsb. Prodr. 28. C. puellarum, Balans. in Journ. de Bot. iv. (Paris, 1890), 77. C. stigmatosa, Koch & Bouchè, Ind. Sem. Hort. Berol. (1855) 9. Lithagrostis Lacryma-Job, Gærtn. Fruct. i. 7, t. i. f. 10.

Throughout the hotter and damper parts of INDIA, wild or cultivated (not wild

in Ceylon).—Distrib. Trop. Asia, cult. in Africa and America.

Stem 3-5 ft., stout, leafy, rooting at the lower nodes. Leaves 4-18 by 1-2 in., wavy, base cordate; sheaths smooth; ligule very short, glabrous. Spikes 2-3 in., suberect, peduncled, male spike ets 3, or 2 with an imperfect one,  $\frac{1}{3}$  in long; gl. I narrowly winged. Fruit ovoid or spherical,  $\frac{1}{3}$  in long, osseous, bluish gray.

VAR. gigantea, Stapf mss; perennial, attaining 15 ft. high, leaves narrower more strict, male spikelets 3-nate at the internodes, often forming long cylindric drooping spikes, gl. I broadly winged, fruit as in the type. C. gigantea, Rowh. Fl. Ind. iii. 569; Wall Cat. n. 8624, 8625. Astch. Cat. Panjub. Pl. 157; Duthie Grass N.W. Ind. 11; Fodd. Grass. N. Ind. 18. C. lingulata, Hack. in Estr. Bot. Zeitschr. (1891) 5.—Rheede Hort. Mal. xii. t. 70—Hot valleys from the N.W. Provinces to Assam and southwards to the Malay Peninsula and Travancore.—Affghanistan.

VAR. stenocarpa, Stapf mss.; fruit subcylindric 1 in. long white osseous. C. stenocarpa, Balams. l. c. C. tubulosa, Hack. in Engl. Bot Jahrb. iii. 260?—Upper Assam, Bruce. Mergui, Griffith. Karen Hills, Wallich.—Tonkin, N.

Guinea.

VAR. Ma-yuen, Stapf mss.; annual, fruit crustaceous or chartaceous. C. Ma-yuen, Roman. in Bull. Soc. Acclim Paris. Ser. 3, viii. (1881) 442. Sikkim and the Khasia hills, ascending to 5000 ft. (cult.). Burma, Watt.—Cochinchina, Borneo, Ins. Philipp.

#### DOUBTFUL SPECIES.

C. AQUATICA, Roxb. Ft. Ind. iii. 571; floating and creeping from 50-100 ft., leaves linear most acute, margins hispid, male spikes drooping many-fid., flowers 32-fold, middle one pedicelled fem., corolla 6-7-valved, seeds turbinate." "Floating in margins of lakes in Lower Bengal," Roxb. This species is unknown to me and to the officers of the Calcutta Bot. Gardens.

## 29. POLYTOCA, Br.

Tall branching grasses; nodes bearded; fig. branches fascicled, spathaceous Leaves long, flat. Spikes solitary or panicled, bisexual and fem. below, or the upper male only, rachis jointed; spikelets geminate, a sessile and a pedicelled. Male spikelets lanceolate, 2-fld.; gls. 4, I many-nerved, 2 keeled; II 5-7-nerved; III and IV hyaline, paleate, triandrous; anthers very long. Lodicules cuneate. Fem. spikelets imbricate, the pedicelled imperfect, its pedicel confluent with the rachis; gls. of sessile spikelet 4, I oblong, coriaceous, margins inflexed

embracing the rachis, at length crustaceous; II thin, acuminate; III hyaline, epaleate; IV hyaline, paleate, fertile. Staminodes and lodicules 0. Ovary minute; styles long, stigmas slender. Grain very small, orbicular, enclosed in the hardened outer gls.—Species 8, tropical Asiatic and Australian.

- \* Infl. mostly compound; male spikelets terminal, superposed, hairy; fem. 3-7. Pedicelled fem. spikelets of one bract-like gl. terminating the joint of the rachis.—Spathes always tightly closed.
- 1. **P. bracteata**, Br. in Bennett Pl. Rav. Jav. 20, t. 5; male spikes rather stiff, pedicelled spikelets mostly (nearly all) rudimentary and adnate to the rachs. Steud. Syn. Gram. Cox heteroclita, Royb. Fl. Ind. III. 572; Wall. Cat. n. 8627.

SIKKIM TERAI, ASSAM and the KHASIA HILLS, ascending to 5000 ft. BURMA, on the Shan hills, Collett.—DISTRIB. Tonkin.

Stem 3-5 ft., stout or slender; sheaths and leaves glabrous, or hirsute with tubercled-based hairs. Leaves  $1\frac{1}{2}$ -2 ft. by  $\frac{2}{3}$ -1 in, margins rough, base contracted. Inflorescence 3-6 in., usually long-pedicelled and digitate; lower branches spreading or deflexed; rachis hairy. Male spikelets  $\frac{1}{4}$  in., glabrous or pubescent; fem. spikelets less than  $\frac{1}{4}$  in, pale, shining; rudimentary pedicelled spikelets lanceolate.  $\frac{1}{4}$ -1 in. long, at length spreading; gl. I oblong, obtuse or emarginate, 2-keeled.

2. P. Wallichiana, Benth. in Journ. Linn. Soc. xix. (1881) 52; male spikes slender flexuous, pedicelled spikelets fiee. Cyathorhachis Wallichiana, Nees ex Steud. Syn. Gram. 403.—Gen. Nov. Wall. Cat. n. 8629.

BURMA; Prome and Tenasserim, Wallich; Pegu, M'Lelland, &c.; Tenasserim,

Wallich, Helfers.

- Stem leaves and sheaths glabrous or hispid with tubercle-based bristles. Leaves 2-3 ft. by 1-14 in, lower narrowed from the middle to the base. Terminal infl. often long peduncled, branches 2-24 in.; lateral more or less enclosed in the spathe; rachis hairy. Male spikelets 4 in.; fem. as long, pale, shining; rudimentary pedicelled spikelets 4 in., lanceolate, at length spreading.
- \*\* Terminal infl. only compound; male not spathaceous, fem. spathaceous, spathe at length expanded, lateral of simple spikes. Pedicelled fem. spikelets of 2 gls., pedicels adnate to the rachis.
- 3. **P. Cookii**, Stapf in Hook. Ic. Pl. t. 2333; male infl. very fragile, spikes 2-3 in., pedicelled spikelets free, iem. spikelets glabrous, gl. I 3-lobulate at the tip.

N. CANARA and the CONCAN, Jacquemont, &c.

Annual. Stem 3 ft. and leaves more or less hispid with tubercle-based hairs. Leaves 13-2 ft. by 2-3 in., margins thickened. Male unt. often long-peduncled, rachis villous; spikelets \( \frac{1}{2} \) in. Fem. spikes 1 in. long; spathe 1-1\( \frac{1}{2} \) by \( \frac{1}{2} \)-\( \frac{1}{2} \) in., at length open above; rachis glabrous; spikelets \( \frac{1}{2} \) in.; rudimentary gl. like I and II of male, but smaller.

- \*\* All infls. of simple bisexual spikes; spikelets glabrous.
- 4. P. semiteres, Benth. in Gen. Plant. iii. 1113. Spathes 1-13 in. always closed, fem. spikelets 2 or more. Chionachne Wightii, Munro ex Benth. in Gen. Plant. l. c. Tripsacum? semiteres, Wall. Cat. n. 8628.

The DECCAN PENINSULA; Palamcotta, Wight. BURMA; Taong-dong bills,

Rootstock creeping; stems 2-2½ ft., stiff, glabrous. Leaves 8-10 by ½-½ in, rigid, tip setaceous, margins thickened; sheaths glabrous or hairy. Spathe 1-1½ in. Spakes 1½-3 in., male part stout, raches glabrous; spikelets ½-½ in. glabrous;

pedicelled spikelets adnate to the rachis; fem. spikelets rather longer, gl. of pedicelled O or minute.

5. P. barbata, Stapf mss.; branches of infl. many umbelled, spathes in. at length open, fem. spikelets solitary, margins of gl. I keeled tip entire. C. arundinacea, Koen. ex Willd. Sp. Pl. iv. 203 (non Lamk.). Coix barbata, Roxb. Fl. Ind. iii. 569; Wall Cat. n. 8626; Dalz. & Gibs Bomb. Fl. 289. C. crypsoides, C. Muell. in Bot. Zert. xix. (1861) 334. C. gigantea, Herb. Russ. ex Wall Cat. l. c. C. Koemgi, Spreng Syst. i. 228; Thw. Enum. Pl. Zeyl. 357. Chionachne barbata, Br in Benn. Pl. Rar. Jav. 18; Trim. Cat. Ceyl. Pl. 106; Aitchis. Cat. Panyab. Pl. 157; Duthre Grass. N.W. Ind. 11, Fold. Grass. N Ind. 19. Ch. Koenigii, Thw. Enum. Pl. Zeyl. 369.

Hot and damp parts of India, from the Panjab to Assam and Munnepore, and

southward to CEYLON .- DISTRIB. Java.

Stems 3-5 ft, glabrous or with the leaves and sheaths bristly with tuberclebased hairs. Leaves 1-2 ft. by \(\frac{1}{4}\)-\frac{3}{4} in., finely acuminate, margin thickened. Spikes 1-11 in., raches usually glabrous. Male spikelets 1 in., glabrous or softly pilose, keels ciliolate; fem. 1 in., glabrous, pale, gl. of pedicelled minute or 0.

6. P. punctata, Stapf mss.; branches of infl. few unequal, terminal subumbellate, outer spathes long green, gl. I of fem. spikelets constricted in the middle, then suddenly dilated into an ovoid obtuse claw, keels broad. Sclerachne punctata, Br. in Benn. Pl Rar. Jav. 15, t. 4. Chionachne Massii. Balans. in Journ. de Bot. (Paris, 1890), 78. Coix sulcata, Herb. Rottl.

The DECCAN PENINSULA, Rottler.—DISTRIB. Java, Tonkin?

Stem slender, branched, glabrous, and leaves glabrous or sparsely hairy. Leaves 6-8 by 1 in., linear-lanceolate, flaccid. Spathes of lower outer branches long, lauceolate. Spikes 1 in.; male spikelets one pair, 1 in., glabrous; fem. 1 in., pale; gl. of pedicelled minute.

## 29\*. ZEA, Linn.

A tall stout annual monocious grass. Leaves broad, flat. Spikelets unisexual, males in terminal racemed spikes; fem. in solitary axillary stout sheathed spikes, rachis thick, inarticulate, spongy. Male spikelets 2-fid., 2-nate, a sessile and a pedicelled at each of the alternating teeth of the inarticulate rachis; glumes 4, acute; I and II subequal, membranous, empty; I enclosing the hyaline paleate III and IV. Lodicules fleshy. Stamens 3, anthers linear. Fem. spikelets 1-fld., sessile, densely crowded in many vertical series on the thick cylindric rachis; glumes 4, membranous, I and II very broad, obtuse or emarginate; III hyaline, paleate, empty; IV hyaline, often 2-fld. Lodicules 0. Ovary obliquely ovoid, plano-convex; style very long, 2-fld, arms papillose. Grain large, subglobose or flattened, surrounded by the marcescent gls.

**Z. Mays**, Linn. Sp. Pl. 971; Beauv. Agrost. 136, t. 24, f. 3; Kunth Enum. Pl. i. 19, Suppl. 15; T. Nees Gen. Fl. Germ. Monocot. i. n. 3, 4. Bonafous Hist. Nat. Mays (Paris, 1836), t. 1-19; Doell in Mart. Fl. Bras. ii. II, 30, t. 11; Roxb. Fl. Ind. iii. 349; Grah. Cat. Bomb. Fl. 240; Duthie Field & Gard. Crops 25, t. 5; Miq. Fl. Ind. Bat. iii. 477. Z. alba, americana & vulgaris, Mill. Gard. Dict. Ed. viii. n. 1, 2, 3. Z. segetalis, Salish. Prodr. 28. Mays zea, Gertn. Fruct. i. 6, t. 1. f. 9.

Cultivated throughout the hotter parts of India.-Native of Peru.

### 30. DIMERIA, Br.

Slender annual or perennial grasses. Leaves narrow. Spikelets 1-fil., unilateral on a single terminal spike or several racemed spikes, sessile or pedicelled, rachis inarticulate. Glumes 4, I linear, rigid; II broader compressed; III smaller, hyaline, empty; IV hyaline, bisexual, entire or 2-lobed, keeled, 1-nerved, usually awned; awn terminal or in the sinus, capillary, twisted at or below the middle. Lodicules minute or 0. Stamens 2, filaments short; anthers small. Styles distinct, stigmas short. Grain linear, laterally compressed, free.—Species 12 or 14, tropical Asiatic and Australian;—all want revision with more copious material.

- \* Spike solitary; spikelets conniving; gl. I erect, II not appressed to the rachis of the spike.
- 1. **D. pusilla,** Thw. Enum. Pl. Zeyl 369; stem filiform, leaves short, rachis very slender compressed-trigonous, spikelets  $\frac{1}{6} \frac{1}{5}$  in. long sessile or pedicelled, gl. II acuminate awned. Hack. Monogr. Androp. 78; Trim. Cat. Ceyl. Pl 107.

The DECCAN PENINSULA and CEYLON (CP 957.)

Very variable, 6-18 in. high.—Amongst the many forms the following appear the most distinct. I cannot satisfactorily identify them with Hackel's descriptions.

D. pusilla, proper; stems 6-8 in. filitorm, raches of spike filiform trigonous smooth or scaberulous on the angles, spikelets pedicelled, pedicel usually naked below villous upwards. D. pusilla, Thw. lc.? Hack Monog. Androp. 78. Ceylon; at Kokotodua, Gardner (CP. 957 in part).—This and the following I have described from Thwaites' type specimens.

Var. pallida, Thw mss.; stem as in D. pusilla proper, spikelets all sessile, or the lowest on the spike pedicelled, awn of gl. I shorter. ?D. Thwaitesu, Hack.

1. c —Ceylon at Damboul, Thwaites (CP. 3955).

Var. elatior; stem 12 in., stouter, somewhat branched, spike longer, rachis as broad as the shortly pedicelled spikelets keeled down the centre margins scaberulous, awn of gl. I sometimes as long as the gl.—CEYLON; at Trincomalee; Glense (CP. 957).

Var. Lawsoni, stem short leafy, spike inclined, rachis broader than the sessile villous spikelets, margius ciliate, gluine II shortly awned.—Malabar; Wynaad, Lawson.

2. D. Kurzii, stem 10-18 in. erect, rachis of spike rather broader than the sessile spikelets strongly ciliate, gl. II acute not awned, more or less ciliate.

BURMA, Kurz (n. 2741); Mergui, Griffith.

Much stouter than any form of D. pusilla, which the spike closely resembles; but the spikes are longer, \(\frac{2}{3}\)-2 in.; spikelets \(\frac{1}{10}\) in. long.—The spikes are sometimes inclined or recurved as in the species with several on the peduncle, hence two spikes may occur. Kurz's specimens are very slender, 12-18 in. long; Griffiths' solitary one is in a very young state, with broader leaves sheathing the spike.

- \*\* Spikes 2-3; erect spreading or involute; gl. I erect or spreading; II usually closely appressed to the rachis.
  - + Rachis capillary.
- 3. **D. Hohenackeri**, Hochst. ex Miq. in Verh. Ned. Inst. III. iv. (1851) 35, stem capillary, spikes very slender, rachis filitorm trigonous, spikelets distant narrow pedicelled, gl. II acuminate dorsally ciliate. Hack. Monog. Androp. 79; Lisboa in Journ. Bomb. Nat. Hist. Soc. vi. (1891), 189.

Psilostachys Hohenackeri, Steud. Syn. Gram. 413; Hochst. in Flora (1856), 90.

N. CANARA and MANGALORE, in rice fields, Hohenacker, Talbot.

Stem 6-8 in Leares short, upper sheathing. Spikes 1-12 in.; rachis with scabrid angles. Spikelets 10 in., awns twice as long; gl. I. very narrow, acuminate, nearly glabrous, at length divaricate.

- †† Rachis trigonous or linear, sometimes as broad or broader than gl. II, joints much shorter than the spikelets.
- 4. D. ornithopoda, Trin. Fund. Agrost. 167, t. 14; spikes very slender, rachis flexuous, spikelets 1 in. sessile or subsessile, glume II linear acute dorsally chate. Hack Monogr. Androp. 81. D. filiformis, Hochst. in Hohenack. Pl. Ind. Or. n. 231. D. stipeformis, Miq. Prolus Fl. Jap. 176; Franch & Sav. Enum Pl. Jap. i. 187. PD. diandra, Griff. Notul. ni. 71, Ic. Pl. Asiat t. 157, f. 2. D. psilobasis, F. Muell. Fragm. vii. 104. D. tenera, Trun. in Mem Acad. Petersb. Ser. vi. ii. (1833), 335; Benth. Fl. Austral. vii. 523. Didactylon simplex & ramosum, Zoll & Mor. Syst. Verz. 100. Andropogon filiformis, Roxb. Fl. Ind. i. 256; Steud. l. c. 372. A. Boxburghianus, Schult Mant ii. 451. A. stipæformis, Steud. l. c. 377. Psilostachys filiformis, Dalz. & Gibs. Bomb. Fl. 305.—Dimeria, Wall. Cat. n. 8839, 8840.

Throughout INDIA; from Nepal and the Khasia Hills to the Deccan, Burma and the Nicobar Islds. (not in Ceylon) - DISTRIB Malay Islds., Japan, Trop. Austral.

Annual, much branched, leafy. Leaves 1-3 in., erect; sheaths glabrous or pilose. Spiles 2, rarely 3; rachis about as broad as the spikelets, margins scaberulous, costa strong. Spikelets linear, acuminate, callus villous, gl. I slender, nearly glabrous; III short, acute; palea 0.—Hackel has 6 varieties of this species, of which more might be made.

5. D. Woodrowii, Stapf in Hook. Ic. Pl. t. 2312; spikes 2 circinately involute, rachis rigid glabrous, spikelets very shortly pedicelled, callus shortly bearded, gl. I and II subequal acute, III linear hyaline, IV shortly awned.

The CONCAN; Ratnagherry district, and near Goa, Woodrow.

Annual. Stem 3-6 in. slender, leafy to the top, simple or sparingly branched; upper internode (or peduncle) with its leaf abruptly deflexed after flowering. Leaves 2-3 in., linear, acuminate, erect, strict, glabrous or sparsely hairy; ligule very short, hyaline. Spakes 3-1 in., at first erect, rachis dorsally convex, concave ventrally. Spikelets few, rather distant, suberect, divergent as the rachis incurves; gl. I glabrous or sparsely hairy; awn of IV about twice as long as its glume; palea 0.—A very peculiar species, at once recognized by the two spikelets forming together a hoop.

6. D. connivens, Hack. Monogr. Androp. 689; annual, rachis of spike nearly as broad as the spikelets ciliate, spikelets in subsessile, callus minutely villous, gl. I very slender ciliate, II oblong-lanceolate acuminate dorsally ciliate.

CHOTA NAGPORE, alt 2000 ft., Clarke.

Stems ascending, 6-10 in. Leaves short, erect. Spikes 1-13 in.; rachis nearly straight, costate. Spikelets erect, closely imbricating; gl. I slender, sparsely ciliate; awn twice as long as the spikelet.

7. D. Lehmanni, Hack. Monogr. Androp. 82; spikes slender spreading, rachis undulate scabrid or ciliate, spikelets sessile ; in. long, callus very shortly bearded, gl. I and II subacute, I narrowly linear, keel ciliate,

III oblong. D. ornithopoda, Thw. Enum 369. Pterygostachyum Lehmanni, Nees ex Steud. Nom. Ed. II. ii. 412, Syn. Gram. 413.

CEYLON, Macrae, Walker, Thwaites.

Annual, branched, 8-10 in. high. Leaves erect, flat, acuminate.

Var. α; glabrous, rachis of spike ciliate, spikelets awned. (C.P. 952.)

Var. β; rachis of spike scaberulous, spikelets not awned. (C.P. 955.)

8. **D. pubescens**, *Hack. Monogr. Androp.* 83; spikes stout spreading, margins of broad straight rachis ciliate, spikelets  $\frac{1}{7}$  in. sessile silky, gl. I and II shortly acuminate, I narrowly linear with membranous margins  $\frac{1}{3}$  longer than III. D. ornithopoda, var. y, Thw. Enum. Pl. Zeyl. 369.

CEYLON, Gardner; Pasdoon Corle, Thwaites (C.P. 956).

Perennial, branched from the base, glabrous to villously hairy. Racemes 2-2½ in., often solitary and inclined; rachis flat,  $\frac{1}{12}$  in. broad or less. Spikelets densely imbricate; gl. I and II silky all over; awn twice as long as the spikelet or longer.

9. **D. fuscescens,** Trin. in Mem. Acad. Petersb Ser. VI. ii. (1833) 335; spikes stout spreading, rachis undulate margins smooth or scaberulous, spikelets \( \frac{1}{2} \rightarrow \frac{1}{2} \righ

NEPAL, Wallich. KHASIA HILLS, alt. 4-5000 ft., Griffith, &c. Tenasseeim, Helfer. The Concan, Lisboa. Ceylon, Gardner, Thwaites (C.P. 3256).

Perennial, 2-3 ft. high, stout, simple or branched. Leaves glabrous or hairy. Spikes 2-4 in.; rachis compressed trigonous. Spikelets reddish-brown; awn twice as long as the gls.—The Tenasserim specimens are small and in a poor state.

10. **D. alata,** Hook. f.; spikes 2-3 rather stout, spikelets  $\frac{1}{10}$  in sessile glabrous callus naked, gl. I scaberulous, II dimidiate-ovate keel broadly winged, III nearly as long as II, awn 0. D. ornithopoda  $\delta$  mutica, Thw. (in part).

CEYLON, Thwaites (C.P. 955 of 1864).

Annual. Stems 6-18 in., tufted, siender, erect. Leaves, 6-12 by  $\frac{1}{6}-\frac{1}{8}$  in., erect, strict, narrowed to the base, and sheaths hirsute with long spreading hairs. Spikes 3 in., strict, spreading; rachis  $\frac{1}{20}$  in., stout, straight, margins scaberulous. Gl. I divaricate; II appressed to the rachis, broadly hyaline; wing opaque, strongly ciliate; III oblong, ciliate, 1-nerved; IV obovate-oblong, ciliate.—The small glabrous spikelets and broadly winged gl. II distinguish this species from D. fuscescens.

- \*\*\* Spikes 4-10 (rarely 3) digitate or fascicled.
- 11. **D.** gracilis, Nees ex Steud. Syn. Gram. 413; leaves not contracted above the sheath, spikes 3-10 long slender flexuous quite glabrous, rachis filiform subtrigonous, spikelets  $\frac{1}{3}-\frac{1}{4}$  in., pedicels long slender glabrous, callus bearded. Hack. Monogr. Androp. 88; Lisboa in Journ. Bomb. Nat. Hist. Soc. vi. (1891) 190. D. laxinscula, Thw. ex Trim. in Journ. Bot. xxiii. (1885), 272, Trim. Cat. Ceyl. Pl. 107.

The Concan, Law; on the Ghats, Lisboa. CEYLON, Macrae, Thwaites, &c. (C.P. 3863).

Perennial, 1-2 ft. high, stout or slender. Spikes 1½-3 in., pale red-brown; gl. I and II, lanceolate, ciliate; I scabrid above the middle or all over; II with narrowly membranous margins; awn twice as long as the spikelet.

12. D. leptorhachis, Hack. Monogr. Androp. 89; leaves contracted

above the sheath, spikes slender, rachis filiform ciliolate at the nodes, spikelets \to \text{in., pedicels very short thickened, callus bearded. D. pilosisima, Thw. Enum. Pl. Zeyl. 369; Trim. Cat. Ceyl. Pl. 107 (not of Trin.).

TENASSFRIM, Helfer, Griffith (Kew distrib. 6799). CEYLON; on Adam's Peak

Perennial, stout. Leaves glabrous or villous. Racemes 2-6 in.; rachis straight or flexuous; internodes \(\frac{1}{2}\)-\frac{1}{3}\) in. in Tenasserim specimens, much shorter in Ceylon ones. Spikelets pale or dark, red-brown; gl. I and II acuminate, ciliate in Ceylon, scaberulous in Tenasserim; II with narrowly membranous margins.

# 31 IMPERATA, Cyrill.

Perennial, erect, often tall grasses. Spikelets 1-2-fid., in spiciform or thyrsiform silvery-silky panicles, binate, both pedicelled, upper fl. perfect, lower imperfect or 0. Glumes 4, membranous, awnless; I and II lanceolate, hairy; III much smaller, hyaline, glabrous; IV still smaller, hyaline, glabrous; palea hyaline, glabrous. Stamens 1-2; anthers large, linear. Styles connate at the base, stigmas linear. Grain small, oblong, free.—Species 5, tropical, chiefly American; 2 Asiatic, one also European.

1. I. arundinacea, Cyrill. Pl. Rar. Neap. Fasc. ii. 26, t 11; paniele very narrow spiciform, branches short appressed, gl. I 5-9-nerved, stamens 2. Br. Prodr 201: Kunth Enum. Pl. i. 477; Hack. Monogr. Androp. 92; Steud. Syn. Gram. 405; Reichb. Ic. Fl. Germ t. 55; Boiss. Fl. Orient. v. 452; Thw. Enum. Pl. Zeyl. 369, Trim. Cat. Ceyl. Pl. 106, Duthie Grass. N.W. Ind. 14, Indig Fodd. Grass. t. 15, Fodd Grass. N. Ind. 22; Artchis. Cat. Punjab. Pl. 173. I. Allang, Jungh. in Tijdschr. Nat Gesch. vn. 295; Steud. l. c. 405 (Alang). I. condensata, Steud. l. c. 431. I. cylindrica, Beauv. Agrost. 165. I. filifolia, Nees ex Steud. l. c. I. Koenigni, Beauv. Agrost. 165; Wall. Cat. n. 8850. I. pedicellata, Steud. in Flora, xxix. (1846) 22, Syn Gram. l.c. I. Sieberi, Opiz. Natural. x. (1825) 190. I. Sisca, Beauv. ex Steud. Nom. Ed. II. i. 805. I. Thunbergii, Nees ex Wall. Cat. n. 8851. Saccharum cylindricum, Lamk. Encycl. 1. 594; Roxb. Fl. Ind. i. 234. Grah. Cat. Bomb. Pl. 239; Griff. Notul. iii. 80. S. diandrum, Koen. ex Retz. Obs. v. 16. S. europæum & S. indum, Pers. Syn. i. 103. S. Koenigii, Retz. Obs. v. 16. S. spicatum, Burm. ex Kunth l.c. S laguroides, Pourr. in Mem Acad. Toul. iii. (1788) 326 S. Ravenne, Bieb Fl. Taur. Cauc. in. 51. Lagurus cylindricus, Linn. Syst. Nat. Ed. x. 878. Calamagrostis Lagurus, Koel. Descr. Gram. 112; Host Gram. Austr. 1v. t. 40.

Hotter parts of INDIA, from the Panjab southward and eastward to Malacca and

Ceylon. - DISTRIB. All warm countries.

Rootstock creeping. Stem 1-3 ft., solid, nodes glabrous or bearded. Leaves erect, often exceeding the stem. Panacle 3-8 in., silvery with dark anthers and stigmas. Spikelets  $\frac{1}{3}-\frac{1}{3}$  in., callus-hairs about twice as long as the gls.; gl. I rather thickened towards the base, dorsally hairy, tip obtuse; II as long as I, 3-7-nerved; III =  $\frac{1}{3}-\frac{1}{2}$  II, oblong, irregularly toothed, nerveless; IV ovate, acute, toothed, faintly 1-nerved or nerveless; palea about half as long as the gl., quadrate, retuse or toothed, nerveless, glabrous.—Hackel distinguishes the Indian form as var. Koenigis, having villous nodes and broader less rigid leaves, but some of the Indian specimens appear to me quite like the Western.

Var. latifolia; stem 3-4 ft. very robust, nodes glabrous, leaves long \( \frac{1}{3} - \frac{3}{3} \) in. broad, palea of gl. IV with long-ciliate lobes.—Tropical Himalaya, from Kumaon to

Assam.

2. I. exaltata, Brongn Voy. Coq. Bot. 101 (excl. Syn.); panicle thyrsiform, lower branches elongate, gl. I 3-5-nerved, stamen 1. Hack. Monogr. Androp. 99. I. caudata, Trin. in Mem. Acad. Petersb. Ser. vi ii. (1833) 331. Pl. jaculatoria, Roem. § Sch. Syst. ii. 289. I. ramosa, Anderss. in Efvers. Vet. Akad. Stockh. (1855) 158. Saccharum Alopecurus, Nees in Hook. Kew Jouin. ii. (1850) 100, Steud. Syn. Gram. 406. S. caudatum, Mey. Prim. Fl Esseg. 68. S. confertum, Presl Rel. Hænk. i. 346. S. contractum & dubium, H. B. & K. Nov. Gen. et sp. 182, 183. P. S. jaculatorium, Lour. Fl. Cochinch. 53; Poiret Encycl. Suppl. ii. 70. S. macilentum, Chauv. ex Steud. l. c. S. negrosense, Steud. l. c. Anatherum porto-ricense, Spreng. Syst. i. 290. A. caudatum, Schult. Mant. ii. 445. Syllepis polystachya, Fourn. ex Hack. in Mart. Fl. Bras. ii. III. 251.

SINGAPORE, Cuming. BURMA; Mergui, Griffith.—DISTRIB. Malaya, N. Hebrides, Am. trop.

Stem tall, up to 7 ft., slender, fistular, glabrous, nodes glabrous. Leaves 2-3 ft. by \( \frac{4}{6}-1 \) in., linear, finely acuminate, smooth, glabrous or sparsely pubescent; sheath glabrous, ligule very short. Panicle 12-18 in, 4-5 in. broad at the base, narrowly subpyramidal; rachis slender, lower branches 3-4 in. long, branchlets and pedicels cliate. Spikelets \( \frac{1}{6}-\frac{1}{6} \) in., like those of I. arundinacea, but gl. I and II fewer nerved; III = \( \frac{1}{8} \) II oblong, deeply irregularly toothed above the middle, glabrous, nerve very slender; IV cuspidately lanceolate from an ovate base, quite entire, glabrous; palea quadrate, many-toothed, glabrous.

### 32. MISCANTHUS, Anderss.

Tall perennial grasses. Spikes long, simple and branched, very slender, crowded at the top of the peduncle into a nodding fan-shaped corymb; rachis obscurely jointed. Spikelets very numerous, in unequally pedicelled pairs, 1-fid., dorsally subcompressed, one or both usually awned, callus with long silky hairs. Glumes 4; I chartaceous, nearly flat with narrow incurved margins; II similar but more convex; III hyaline, ovate, epaleate; IV hyaline, 2-fid or 2-toothed, with a long awn (rarely short or 0) in the sinus; palea minute. Lodicules cuneate. Stamens 2-3. Styles free, stigmas rather short. Grain linear-oblong, free.—Species 5-6, Asiatic and Polynesian.

1. M. nepalensis, Hack. Monogr. Androp. 104; spikes very many densely crowded 5-7 in., hairs of callus much longer than the spikelet. Eulalia nepaleusis, Trin. in Mem. Acad. Petersb. Ser. vi. ii. (1833) 333, Sp. Gram. Ic. t. 332. Pollinia nepaleusis, Benth. ex Duthie Grass. N.W. Ind. 16.—Erianthus, Wall. Cat. n. 8848.

TEMPERATE HIMALAYA; from Garwhal to Bhotan, alt. 5-7500 ft., Wallich, &c.

KHASIA HILLS, alt. 4-5000 ft. NAGA HILLS, Prain.

Stem 3-6 ft., as thick as a goose-quill in large plants. Leaves 6-18 in. by  $\frac{1}{3}-\frac{1}{2}$  in., margins smooth, midrib stout; lighle rounded. Spikes flexuous; rachis capillary, glabrous; pedicels  $\frac{1}{3}$  in. Spikelets  $\frac{1}{14}$  in. long, purplish or golden yellow, shining; gl. I and II minutely 2-toothed.

2. M. nudipes, Hack. Monogr. Androp. 109; spikes few 2-3 in., hairs of callus not longer than the spikelet. Erianthus nudipes, Griseb. in Nachr. Akad. Wiss. Goett. (1868) 92.

SIEKIM HIMALAYA, alt. 9-12,000 ft., J. D. H. UPPER ASSAM; Mishmi Hills, Griffith.

Much smaller than *M. nepalensis*, 2-3 ft. high, with leaves 4-10 in. long, the margins of which are smooth as in that plant; spikelets very much longer,  $\frac{1}{8} - \frac{1}{3}$  in. long, and narrower.

### 33 SPODIOPOGON, Trin.

Tall grasses. Leaves often long-petioled. Spikelets 1-2-fld., panicled, laterally compressed or subterete, 2-3-nate, lower sessile male, upper bisexual, rachis jointed. Glumes 4; I and II subequal; I lanceolate, 5-9-nerved, tip acuminate or toothed; II membranous, lanceolate, 3-7-nerved; III hyaline, paleate or not, 3-androus or empty; IV 2-fid or 2-partite with a very slender exserted awn in the sinus; palea shorter. Lodicules cuneate. Anthers linear. Stigmas linear. Grain free, narrowly fusiform.—Species about 5. Asiatic.

1. S. albidus, Benth. in Journ. Linn. Soc. xix (1881) 66; decumbent, leaves long-petioled broad flaccid, panicle narrow, spikelets 2-fld. laterally compressed, silkily villous, gl I membranous. Hack. Monogr. Androp. 185. Andropogon albidus, Hb. Heyne. A. rhizophorus, Steud. Syn. Gram. 381; Duthie Fodd. Grass. N. Ind. 26.—Andropogon? Wall. Cat. n. 8821.

RAJPOOTANA; on Mt. Aboo, Duthie. DECCAN PENINSULA, from the Concan to

A weak struggling tufted branched annual?, 2-4 feet; stem very slender, much branched, leafy. Leaves 6-10 by \(\frac{1}{2}\)-\(\frac{1}{4}\) in., flaccid, linear-lanceolate, acuminate, 1-nerved, usually suddenly narrowed into a slender petiole 1-3 in. long; sheath 3-5 in.; ligule oblong, glabrous. Panicle at first enclosed in a long narrow spathaceous leaf-sheath; rachis compressed, ciliate. Spikelets about \(\frac{1}{3}\) in. long, white, shortly pedicelled. Gl. I minutely 2-mucronate, 7-nerved; II broader, much compressed; III truncate tip erose.

2. **S. dubius**, *Hack. Monogr. Androp.* 186; erect, leaves sessile long narrow and sheaths softly hairy, panicle narrow, spikelets 1-fid. silkily villous, gl. I chartaceous 7-9-nerved.—Andropogon, n. 16, *Herb. H. f. & T.* 

TEMPERATE HIMALAYA; from Kashmir to Garwhal, alt. 6-8000 ft., Thomson,

Perennial. Stem 2-4 ft., solid, as thick as a goose-quill, quite smooth. Leaves 12-18 by \( \frac{1}{2} \) in., smooth hairy or villous, base villous, margins scalerulous, base villous, midrib broad, white; sheath glabrous; ligule densely villous. Panicle 6-8 in., narrowly oblong, erect, very dense-fld., pale; pedicels very short. Spikelets \( \frac{1}{2} \) in.; gl. I acuminate, dorsally convex, margins narrowly incurved; II as long, subchartaceous, 8-5-nerved, hairy dorsally, sometimes obtuse and apiculate; III oblong, obtuse, hyalme, 1-nerved ciliate; IV shorter than II, cleft into lanceolate segments with a slender interposed awn as long as the spikelet, 8-nerved below the middle; palea lanceolate, 2-fid.

3. S. cotulifer, Hack. Monogr. Androp. 187; tall, erect, leaves long sessile and petioled, panicle lax effuse branches and long capillary pedicels short subclavate, spikelets 1-fid. lanceolate terete sparsely hairy, gl. I and II coriaceous strongly nerved. Eulalia cotulifera, Munro ex Mig. Prolus. Fl. Jap. 177; Franch. & Sav. En. Pl. Jap. ii. 189. Miscanthus cotulifer, Benth. in Journ. Linn. Soc. xix. (1881) 65. Eccollopus andropogonoides, Steud. Syn. Gram. 124. Andropogon cotulifer, Thunb. Fl. Jap. 41.

WESTERN TEMPERATE HIMALAYA, alt. 4-6000 ft., from Kashmir, Clarke, to

Garwhal, Jacquemont, Duthie. Khasia Hills, alt. 3-4000 ft., J. D. H. & T. T.— DISTRIB China, Japan.

Perennial. Stem 3-8 ft. or more from a woody branched stock, as thick as a swan's quill or less. Leaves 2-3 ft. by  $\frac{1}{2}$ - $\frac{2}{3}$  in.; sheath long, grooved; ligule short. Panicle 6-12 in., rachis slender, terete, branches whorled, capillary, lower 1-3 in., lax-fld., flowering towards the ends; pedicels  $\frac{1}{10}$ - $\frac{1}{8}$  in., clavellate, tips cupped. Spikelets  $\frac{1}{2}$  in, green; tall callus bearded; gl. I and II very strongly 7-9-nerved, nerves scaberulous, tips 2-dentate and very shortly awned; III oblong, tip rounded, scaberulous above the middle, not ciliate; palea lanceolate, subciliate; IV glabrous, cleft to below the middle into setiform lobes, awn twice as long as the spikelet; palea large, broadly ovate, obtuse, ciliate, nerveless.—A peculiar grass very unlike the other species.

# 34. POLLINIA, Trin.

Annual or perennial grasses. Spikes subdigitately approximate or fascicled, hirsute silky or ciliate, rachus fragile. Spikelets bunate a sessile and pedicelled rarely both pedicelled, 1-fid. or the sessile 2-fid. Glumes 4, I membranous or coriaceous, dorsally flattened or concave, truncate often narrowly, or tip 2-toothed, margins narrowly inflexed throughout its length; II as long, usually laterally compressed, keeled, acute, rarely awned; III hyaline, ciliate, rarely neuter or male, paleate (sometimes represented by a gl-like palea): IV very short, hyaline, entire 2-fid or 2-auricled or reduced to a dilated base of the long twisted exserted awn; palea small or 0. Lodicules obliquely truncate. Stamens 3, rarely 2. Stigmus long. Grain free.—Species about 30, tropical and subtropical of the Old World.

The characters by which Pollinia is distinguished from Ischamum are very unsatisfactory. The colour of the hairs of the spikes in Sect. Eulalia cannot be altogether depended upon; nor can the sexuality of the spikelets and presence or absence of gl. III be in Sect. Leptatherum. The apparent replacement of gl. III in some species by a palea as long as gl. I and concave towards it, first observed and commented on by Hackel (Androp. 171) is a very curious departure from the normal condition of the spikelet in Antropogoneæ. It is not confined to Pollinia.

- Sect. I. Stem erect. Leaves not conspicuously constricted or petioled above the sheath. Gl. I as long as II, narrowly truncate; II not broadly truncate; III or its palea present.
  - \* Glume II of sessile spikelets awned. Basal sheaths of stem naked.
- 1. P. articulata, Trin. in Bull. Sc. Acad. Petersb. (1836) 71; annual, very slender, leaves usually filiform, spikes usually very many, hairs of rachis white, spikelets \(\frac{1}{2}\to \frac{1}{0}\) in brown, gl. I narrowly truncate, keels villous below with white hairs, II glabrous except the margins, III (? palea of gl. IV) ovate obtuse, IV narrowly oblong 2-fid or 2-toothed, awn very long clilate, palea short broad. Hack. Monogr. Androp. 153; Benth. Fl. Hongk. vii. 525. P. setifolia, Nees in Hook. Kew Journ. ii. (1850) 101. Pogonatherum contortum, Brongn Bot. Voy. Coq. 90, t. 17. Erianthus articulatus, F. Muell. Fragm. Phyt. Austral. viii. 118. Eulalia concinna, Nees ex Steud. Syn. Gram. 412. Andropogon koretrostachys, Trin. in Mem. Acad. Petersb. Ser. vi. ii. (1833) 273. A. brunneus, Heyne in Herb. Rottler. A. asthenostachys, Steud. l. c. 381.—Andropogon, Wall. Cat. n. 8813, 8814.

Plains of lower Gangetic Valley and Behar, ascending to 3000 ft. Sikkim and Khasia Hills. Chota Nagpur, Gamble. Nilghiri Hills; the Wynaad, Heyne. Burna, Wallich.—Distrib. Malaya, China, Australia.

Stem 1-2 ft, erect, tufted, nodes glabrous. Leaves 6-18 in., erect, flexuous, \( \frac{1}{1-10} \) in. broad (except in Wallich's n. 8813), glabrous. Peduncle filiform. Spikes \( \frac{2}{2} \) in., fascicled, very slender, erect \( Spikelets\) amongst the smallest of the genus; gl. IV very variable in length and in depth of lobing, sometimes subentire, awn sometimes 1 in long.—Hackel has two subspecies, one with the nodes of the spike longer and not disarticulating, which includes the Burmese plant of Wallich, n. 8814, and the Sikkim plant; the other has fragile spikes with much shorter nodes, to which Wallich's Burmese, n. 8813 belongs; this latter is a much taller stouter plant with leaves \( \frac{1}{4} \) in. broad and stems thicker than a crow-quill.—What Hackel describes as gl. III appears to me to be the palea of gl. IV, for it surrounds the ovary.

Var. β, pedicellata, Hack. mss.; both spikelets long pedicelled. Kumaon,

Duthre.

2. **P. pallens**, *Hack. Monogr. Androp.* 156; leaves very slender, spikes 5-10 sılkıly hairy white, rachis slender, spikelets  $\frac{1}{5}$  in., gl. I narrow membranous bicuspidate shortly villous, II laxly villous, III oblong obtuse ciliate, IV narrow 2-fid, awn 2-3 times as long as the spikelet.

KHASIA HILLS, alt. 5000 ft., Griffith, &c -- DISTRIB China.

Stem 2-3 ft., slender; nodes glabrous. Leares 12-20 by  $\frac{1}{10-6}$  in., hairy beneath, margins revolute, tips filiform. Spikes 2-4 in , slender, silkily hairy. Spikelets nariowly lanceolate. Gl. I 2-nerved; II with the capillary awn very variable in length, keel and margins ciliate; III oblong obtuse, ciliate; IV ciliate, oblanceolate, adnate portion of awn forked about half-way down; palea broadly ovate or orbicular, entire, not ciliate.

- \*\* Glume II of sessile spikelet not awned.
- + Basal sheaths of stem naked.
- § Spikelets 1 in.
- 3. P. quadrinervis, Hack. Monogr. Androp. 158; spikes 3-6 and pedicels villous with long silvery-grey hairs, spikelets \(\frac{1}{6-4}\) in. oblong-lanceolate subacute, gl. I dorsally concave 4-nerved (often obscurely), III glabrous, IV short broadly deeply obcordate, awn 3-4 times as long as the spikelet, palea short broad. P. villosa, Munro in Benth. Fl. Hongkong, 420 (non Spreng). Erianthus tristachyus, Nees in Hook. & Arn. Bot. Beech Voy. 241; et in Pl. Meyer. 183 (excl. Syn.).—Andropogon, Wall. Cat. n. 8808.

Subtropical Himalaya; from Simla to Sikkim, the Mishmi, and Khasia Hills, alt. 3-5000 ft., Clarke. Pegu, alt. 4-6000 ft., Kurz —Distrib. China.

Stem 1-2 ft., leafy upwards, nodes glabrous. Leaves narrow, glabrous or hairy beneath, or on both surfaces, or with the sheath hirsute, tips finely acuminate; ligule oblong. Spikes 3-5, 2-6 in., erect or flevuous. Spikelets pale yellow-brown; callus hairs long white; gl. I with hispid keels above, tip contracted minutely truncate, margins rather broadly inflexed; II acute, minutely apiculate, sub 3-nerved, keel smooth, margins ciliate; III linear-oblong, long-ciliate above; IV with the adnate awn torked towards the base, lobes rounded ciliolate; palea lanceolate, ciliolate.—Nees, as Hackel observes, errs in describing the base of the stem as rufous-haired. The Khasia plant has softly villous foliage and has paler spikes, and closely resembles P. speciosa, var. heterotrucha.

Var Wightii; stem tall stout silky below the panicle, leaves 1 in. broad acute, spikes 3-7 in., spikelets nearly 1 in , gl. I 2-4-nerved, IV cuneately obovate broadly

2-lobed.—Pulney Mts., Wight. Possibly a species, differing from quadrine vis in the broad leaves which have not setaceous tips and in the broad gl. IV.

4. **P. hirtifolia**, Hack. Monogr. Androp. 165; spikes few, rachis and pedicels villous with long pale violet hairs, spikelets  $\frac{1}{6}$  in linear-oblong, gl. I dorsally slightly concave obscurely 4-nerved, keels laxly villous with long hairs, gl. IV short broadly obovate-oblong 2-lobed, awn several times longer than the spikelet glabrous, palea minute.

WESTERN TEMPERATE HIMALAYA, alt. 5500-8000 ft., from Simla, Huegel, to

Kumaon, Strachey & Winterb. (n. 925).

- Stem 2-3 ft., leafy, nodes glabrous. Leares 8-18 in., very narrow, more or less hirsute beneath or on both surfaces, tips filiform; ligule very short, long-bearded. Spikes 3-8, rather distant, 3-7 in. long, joints and pedicels rather stout, hairs shorter than the pale brown spikelets; gl. I chartaceour, shining, tip entire, obtuse or truncate, keels ciliate aculeate above; II obtuse, glabrous except the ciliate margins, keel smooth; III lanceolate, ciliate, nerveless; IV ciliate 3-nerved; palea broadly ovate, glabrous.—The joints of the rachis are decidedly obliquely truncate. Very near P. quadrinervis, of which it may be a variety.
- 5. **P. Thwaitesii**, *Hack. Monog. Androp.* 163; stems short, leaves chiefly radical very slender subdistichous, spikes 2-3, rachis and pedicels villous with white hairs, spikelets  $\frac{1}{6}-\frac{1}{4}$  in lanceolate, gls. I concolorous acute 2-nerved, IV linear 2-fid lobes narrow acute, awn more than twice as long as the spikelets, palea minute. P. tristachya, var. *Thw. Enum.* 368, var. distachya, *Trim. Cat. Ceyl. Pl.* 106.

CEYLON; in swamps, alt. 7000 ft., Gardner, Thwaites.

Stem short, lengthened downwards and nodose, above densely clothed for 1-3 in. with subdistichously imbricating leaf-sheaths, 1-2 in. long, which are produced into slender wiry erect convolute leaves 6-12 in. long; ligule minute. Spikes 2-3 in. long. Gl. I pale brown to the tip, dorsally concave, margins narrowly incurved; keels villous; II lanceolate, acute, keel hairy below scaberulous above; III linear-lanceolate, acute, convolute, obsoletely 2-nerved, tip chiate; IV nearly as long, glabrous; palea ovate, ciliolate.

6. **P. mollis,** Hack. Monogr. Androp. 161; spikes usually many, rachis and pedicels villous with very long silvery-white hairs, spikelets  $\frac{1}{6}-\frac{1}{6}$  in. narrowly lanceolate acuminate dorsally flat faintly 2-nerved, IV narrow shortly 2-fid or 2-toothed, awn 3- or more times longer than the spikelet, palea minute. Erianthus mollis, Griseb. in Goett. Nachr. 1868, 92. Eulalia mollis, Munro mss.

TEMPERATE HIMALAYA; from Kashmir to Sikkim, alt. 5-8000 ft.

Stem 10-12 in., slender, tufted, leafy chiefly at the base. Leaves 2-3 in., narrowly lanceolate; sheath glabrous or ciliate, ligule very short, bearded. Spakes 3-10, 1-2 in. long, crowded, flexuous, joints and pericels slender beautifully silvery-silky with very long hairs. Spakelets pale; gl. I thin, villous, hairs much longer than itself, lower half dark brown, upper pale, tip obscurely notched or 2-mucronate; II subacute, dorsally sparsely hairy, keel smooth, margins ciliate; III lanceolate, hyaline and ciliate in the upper half, 1-nerved; IV much shorter, awn very slender; palea glabrous.—Almost intermediate between Pollinia and Erianthus, Hack, l. c. 162.

- §§ Spikelets 10-1 in.
- 7. P. argentea, Trin. in Bull. Sc. Acad. Petersb. i. (1836) 71; spikes many, rachis and pedicels villous with silvery hairs, spikelets  $\frac{1}{10}$  in. linear-oblong pale, gl. I dorsally flat nerveless membranous above the middle

villous or glabrate below it, IV linear 2-fid, lobes narrow acute, awn several times longer than the spikelet ciliate, palea 0. Hack. Monogr. Androp. 162. P. tristachya, Thw. Enum. Pl. Zeyl. 368 (in part); Benth. Fl. Austral. vii. 527. Duthie Folds. Grass. N.W. Ind. 26, t. 53. Eulalia argentea, Brongn. Voy. Coq. Bot. 92. Erianthus rufus, Nees ex Steud. Syn. Gram. 409 (partim). E. hexastachyus, Hochst. in Hohen Pl. Ind. Gr. n. 279; Maq. Anal. Bot. Ind ii. 35. E. Roxburghii, F. Muell. Fragm. Phyt viii. 117. E. tristachyus, Nees in Herb. Strach. & Winterb. No. 4; in Hook. & Arn. Bot. Beech. Voy. 241. Saccharum rufum & tristachyum (in part), Steud. l.c. 408. Andropogon minutiflorus & hexastachyus, Steud. l.c. 379, 380. A. trispicatus, Schult. Mant. ii. 452. A. tristachyus, Roxb. Fl. Ind. i. 256.—Andropogon, Wall. Cat. n. 8811.

TROPICAL HIMALAYA, alt. 1-5000 ft, from Kumaon eastwards to the Khasia Hills, Bengal, Behar and southward to Ceylon.—Disteib. Malaya, Australia.

Stem 2-3 ft. high, leafy, or in small specimens leafy at the base chiefly. Leaves 12-18 in., rarely \(\frac{1}{2}\) in. broad, glabrous or sparsely hairy; ligule very short, bearded. Spikes 2-12, 1\(\frac{1}{2}\)-6 in. long, flexuous; rachis and pedicels slender. Gl. I thin, pale brown below, pale yellow above the middle; II and III as in P. hirtifolia, but IV longer and narrower.—Roxburgh describes this as an annual delicate beautiful species, but most of the specimens appear to be perennial. The very small spikelets resemble those of P. articulata.

8. **P. fimbriata**, Hack. Monogr. Androp. 164; stems very slender shining, leaves very narrow, spikes 2-4 villous with white hairs, joints very short slender, spikelets  $\gamma_0 - \frac{1}{2}$  in., gl. I lanceolate truncate nerveless dorsally smooth depressed, keels ciliate, II obtuse, III oblong-lanceolate ciliate, IV narrow 2-fid, awn much longer than the spikelets ciliate, palea very minute or 0.

WESTERN HIMALAYA, Simla, alt. 7-8000 ft., Thomson. MALABAR and CONCAN,

Stocks, &c. PEGU, M'Lelland.

Annual. Stem 1. 2 ft., internodes much longer than the sheaths, nodes glabrous. Leaves 6-10 by \( \frac{1}{4} \) in., flaccid, sparsely hairy above; sheath glabrous; ligule a ciliolate ridge. Spikes 1-3 in., long-pedunded, flexuous, pale; rachis slender, joints densely villous; gl. I with villous keels above, obscurely 2-toothed; IV with oblong ciliate lobes.—Hackel describes gl. IV. as epaleate, but I find a minute palea. He suspects that Andropogon conjugatus, Roxb. (Fl. Ind. i. 255) to be closely allied, but Roxburgh describes his plant as the smallest of the genus, with minute leaves, the two spikes as exactly paired and touching one another; which is not the case in P. fimbriata.

- †† Basal sheaths of stem villous or woolly.
- 9. **P. phæothrix,** Hack. Monogr. Androp. 168; basal sheaths rustytomentose, leaves very slender, spikes 2-4, spikelets  $\frac{1}{3} \frac{1}{5}$  in., gl. I broadly or narrowly truncate nerveless or faintly 2-nerved dorsally hispidly villous, IV short deeply 2-fid segments nurrow, palea small obovate cliate. P. Cumingii, Thw. Enum. Pl. Z-yl. 368; Trim. Cat. Ceyl. Pl. 106 (non Nees). P. argentea, Balans. in Journ. de Bot. (Paris, 1890) 81. Erianthus, aureus, Nees in Wight Cat. n. 1690 (excl. syn.); Steud. Syn Gram. (sub Eul. nepalensis). E. Cumingii, F. Muell. Fragm. viii. 118. E. tristachyus, Nees l. c. n. 1691. Andropogon pilosus, Willd. ex Wight l. c. 1690. A. brunneus, Heyne in Herb. Rottl.

NILGHIRI HILLS, alt. 6-7000 ft. Wight, &c. CEYLON, in the Central Provinces.

—DISTRIB. Tonkin.

Stem 18-24 iu., slender; peduncle silky under the panicle. Leaves 6-18 in.,

rarely  $\frac{1}{0}$  in. broad, acute, short and filiform in some Nılghiri specimens, glubrous or hairy; ligule short, bearded. Spikes 1-3 in., stout, dark brown, rather distant, joints about  $\frac{1}{2}$  as long as the spikelets. Spikelets linear-oblong; gl. I dorsally densely villous chiefly at the sides and above; II tip narrowly truncate, keel obscure hairy about the middle; III as long as I, nerveless, ciliate above the middle; IV half as long, awn stout inserted in the cleft, broadening out and vanishing.—A Tonkin specimen is  $3\frac{1}{2}$  ft. with broader leaves and white hairs on the rachus.

10. **P. birmanica**, Hook. f: tall, stout from a very stout rootstock with rusty-woolly basal sheath, leaves narrow glabrous, spikes few 3-6 in. strict erect, rachis stout villous, spikelets  $\frac{1}{6}$  in. oblong, gl. I narrowly truncate nerveless, IV very narrow 2-fid eciliate.

BURMA; Yomah, Kurz.

Rootstock as large as a walnut. Stem 4-5 ft., villous below the panicle; nodes pubescent. Leaves 10-18 in., smooth, glabrous. Spikes closely appressed to the rachis, villous with golden-brown hairs; joints as long as the spikelet, obliquely truncate. Spikelets dark brown; gl. I doisally flat, sparsely villous, sides copiously so, margins rather broadly incurved from base to apex; II narrowly oblong, obscurely keeled, sides villous; III oblong-lanceolate, hyaline, chiate; IV very small, awn  $\frac{1}{3}$  in. long; palea orbicular-ovate, long-chiate.—Possibly only a very large form of P. phaothia, with a stout rootstock, and rachis of the spikes narrower.

11. P. speciosa, Hack. Monogr. Androp. 159; tall, stout, basal sheaths clothed with pale yellow-brown wool, leaves narrow usually villously hirsute, spikes 3-5 often very long slender flexuous villous with pale yellow-brown hairs, spikelets & in. oblong, gl. I narrowly truncate faintly 4-nerved back and sides villous, IV narrowly 2-fid lobes acute eciliate, awn tortuous and twisted, palea very small suborbicular. Erianthus speciosus, Debeaux in Act. Linn. Soc. Bord. xxxii. (1878) 53.—Erianthus, No. 9, Herb. Ind. Or. Hf. & T.

KHASIA HILLS, alt. 5-8000 ft., common. NAGA HILLS, Prain.—DISTRIB. China.

Stems 3-4 ft., densely tufted, peduncle silky below the panicle. Leaves 12-18 by \$\frac{1}{2} \text{in}\$, densely villously tomentose on both surfaces in the Khasia specimens (var. heterotricha, Hack. mss.), tips filiform; ligule a long beard. Spikes 3-8 in., joints slender \$\frac{1}{2}\$ the spikelet. Spikelets with sometimes parti-coloured hairs, those of the callus white or concolorous; gl. I narrowly oblong-lanceolate; II subacute, dorsally sparsely hairy, margins cihate; III linear-oblong, cliate; IV shorter, linear-oblong, lobes shorter than the gl.; awn several times longer than the spikelet, vanishing downwards in the gl. Lodicules 2-fid, ciliate.—The Naga Hill specimen has glabrous leaves like the Chinese. Closely resembles P. hirtylora and quadrinervis, differing in the woolly basal sheaths, colour of hairs of spike, and narrow gl. IV. In Sampson's Chinese specimens preserved at Kew (the plant described by Hackel) the base of the stem is wanting; but in fine ones collected at Ichang by Henry, the basal sheaths are woolly, exactly as in the Khasian plant.

12. P. velutina, Hack. Monogr, Androp. 169; tall, stout, basal sheaths villous with long silky hairs, leaves narrow glabrous, spikes 3-8 long, villous with long pale yellow-brown hairs, spikelets \( \frac{1}{6} \) in. oblong, gl. I narrowly truncate 2-cuspidate 4-nerved, back and sides villous, IV narrowly 2-fid or 2-toothed ecihate, awn tortuous and twisted, palea broadly ovate shortly ciliate.

KHASIA HILLS, alt. 4-5000 ft. J. D. H. & T. T., Clarke,

Except in the silky villous clothing of the basal sheaths of the stem, this hardly differs from glabrous states of *P. speciora*, but whereas the leaves of *speciosa* are VOL. VII.

(as far as has been observed) always hirsutely villous in the Khasia, those of telutina are always glabrous. Gl. IV varies in the breadth and depth of its lobes which are obtuse or acute.—Duthie (Grass. N.W. Ind 15) gives this as a N.W. plant, but I have seen no specimens from west of the Khasia Hills.

Sect. II. Stem decumbent below. Leaves not contracted or petioled on the sheath. Gl. I shorter than II, truncate; II broadly truncate; III absent or present.

13. **P. Gumingii**, Nees in Hook. Kew Journ. ii. (1850) 98; leaves short flat, spikes 2-4 distant slender densely villous with red-brown hairs, spikelets  $\frac{1}{10} - \frac{1}{3}$  in. oblong, gl. I dorsally hairy hairs longer than the gl., III 0, IV minute 2-fid, awn very slender 3-4 times as long as the gl., palea minute. Hack. Monogr. Androp. 167 (excl. var fulva). Steud. Syn. Gram. 373. P fulva, var leptophylla, Benth. Fl. Austral. vii. 526. Audropogon aureo-fulvus, Steud. I. c. 373. A. Leschenaultianus, Decne. Herb. Timor. Descr. 29.

UPPER GANGETIC PLAIN; Moradabad, Thomson. KUMAON; at Dehra-dun,

Duthie. Sikkim Terai, Clarke.—Distrib. E. Asia, Malaya, Australia.

Stem 12-18 in., hardly thicker than a sparrow's quill, tufted, decumbent below with a cending leafy branches; nodes sometimes proliferous. Leaves 2-4 in., linear-lanceolate, finely acuminate; lower sheaths harry; liquie 0 or obscure, hairy. Peduncle filitorm. Spikes slender, 1½-2 in., subdigitate; joints villous, shorter than the spikelets. Spikelets with a shortly bearded callus; gl. I truncate, often 2-cuspidate, 2-nerved or nerveless, margins and tip collate; II longer and broader than I, truncate, keel chiate above the middle, sometimes shortly awned; III absent in all the specimens which I have examined; IV very variable, narrow with subulate lobes in the Moradabad specimen, most minute and 2-toothed in the Sikkim and Kumaon ones, with lanceolate subulate lobes in Tonkin ones.

14. **P. Ridleyi**, Hack. in Ester. Bot. Zeitschr. xl. i. (1891) 7; spikes 3-6 digitate, spikelets  $\frac{1}{5}$  in., gl. I broadly truncate entire or 3-toothed densely villous with dark brown hairs shorter than the gl., II cuneate-obovate, III present or ab-ent, IV short linear-oblong abruptly awned, awn twice as long as the spikelet or imperfect, palea minute or 0.

MALAT PENINSULA; Pahang and Johore, Ridley, Feilding.—DISTRIB. Borneo. Stem compressed, 6-10 in., creeping below. Leaves 6-20 by  $\frac{1}{10-\frac{1}{8}}$  in., subdistiohous, rigid, flat or convolute; sheath glabrous. Spikes  $1\frac{1}{2}-2\frac{1}{2}$  in., erect, rather stout, joints and pedicels =  $\frac{1}{2}$  the spikelets, stiffly ciliate. Spikelets linear-oblong; gls. dark; I ciliate at the truncate apex, dorsally flat; II sub 3-nerved; III if present hyaline, obscurely 3-nerved, with an oblong palea larger than itself; IV half as long as II.—Habit of P. Cumingii, but the leaf-sheaths are all glabrous, the spikes fewer digitate much darker coloured, the hairs of gl. I are much shorter and paler.

Sect. III. LEPTATHERUM. Stem prostrate or decumbent. Leaves conspicuously contracted at the base or petioled; basal sheaths naked. Gl. I often deeply channelled dorsally; III present or absent, empty or male; when absent the palea is sometimes as long as gl. I, hyaline or rigid, faintly 2-nerved or nerveless.

\* Triandrous; anthers long narrow.

15. P. eucnemis, Neesex Steud. Syn. Gram. 409; leaves subpetioled, spikes few or many more or less villous with purple hairs, joints short clavate, spikelets & in. oblong, gl. I dorsally sulcate truncate keels shortly

ciliate, IV shortly 2-fid, palea minute. Hack. Monogr. Androp. 173.—Andropogon, Wall. Cat. n. 8812.

Buema; near Prome, Wallich; Popan district, Collett; Pegu, Scott, Kurz.—Distrib. Celebes.

Stems elongate, diffusely branched, stout or slender, smooth, polished; nodes glabrous; sheaths much shorter than the internodes. Leaves 2-10 in., from elliptic to lanceolate, acute, tips setaceous, nerves slender, and sheath sparsely hairy; ligule short, ciliate. Spikes 6-20, densely fascicled, 3-5 in. long, rather stout, pale; joints half as long as the spikelets, often pyriform, margins densely ciliate with purple hairs. Spikelets shining, callus shortly bearded; gl. I truncate, strongly ciliate, dorsally scaberulous; II 2-toothed, shortly awned; III 0, or very slender, ciliate, with a lanceolate acuminate glabrous 2-nerved palea as long as gl. I, triandrous or neuter; IV minute, oblong, acutely 2-toothed; awn very slender \$\frac{1}{2}\$ in.

16. **P. Stapfii**, *Hook. f.*; branches tall from the distant smooth internodes of a long prostrate stem, leaves elliptic-lanceolate acuminate, spikes erect densely fascicled shortly stipitate thickly softly hirsute with fulvous brown hairs each with imperfect naked spikelets at the base, joints and pedicels very stout hollow, gl. I dorsally flat truncately 2-toothed hirsute all over 5-7-nerved, II dorsally convex hirsute aristulate, III 0, IV minute 2-toothed, awn very slender, palea very small, pedicelled spikelet very small awned.

ARRACAN; on low hills of sandstone at Akyab, Kurz.

Stem prostrate and ascending, 12-18 in. long and more, rooting at the lower swollen nodes, as thick as a crow-quill, fistular; internodes 2 in. long, quite smooth; branches 2-3 ft. high, again branched, erect, internodes 2 in. long, quite smooth; branches the lower of which are open and scarious. Leaves 4-6 by \(\frac{1}{2}\)-\frac{1}{2}\ in., fist, flaccid, very thin, setaceously acuminate, sparsely hairy, midrib slender, margins smooth; ligule membranous, truncate, ciliate. Spikes 2-3 in., erect; joints \(\frac{1}{2}\) shorter than the spikelets and nearly as broad as the sessile one, very stout, truncate, plano-convex, hirsute all over the back and sides; pedicel of upper as large as the joint but rather shorter. Sessile spikelet concealed between the joint and pedicel, \(\frac{1}{2}\)-\frac{1}{2}\) in.; callus short, hirsute; gl. I oblong, flat, sub 2-toothed, 5-nerved, nerves sometimes anastomosing, margins narrowly incurved from base to tip, copiously ciliate; II cymbiform, 1-nerved, 2-toothed; IV and its nerveless oblong palea eciliate; awn = spikelet or longer, very slender, column twisted. Pedicelled spikelets = about \(\frac{1}{2}\) the sessile, elliptic, shortly hirsute, fem. or neuter, gls. \(\frac{4}{2}\) Basal spikelets of the spikes smaller than the perfect, sessile, closely appressed to the rachis, sparsely hairy or nearly glabrous, gl. I dorsally more or less channelled.

17. P. vagans, Nees ex Steud. Syn. Gram. 410; leaves sessile, spikes 3-5, joints slender shortly ciliate, spikelets  $\frac{1}{8-6}$  in. linear-oblong, gl. I obovate-oblong dorsally sulcate glabrous ciliate, IV very minute 2-toothed, awn twice as long as the spikelet, palea minute toothed. Hack. Monogr. Androp. 173.—Andropogon, Wall. Cat. n. 8807 B.

NEPAL, Wallich.

Stem larly branched, slender, glabrous. Leaves 2-4 in., very narrow, setaceously acuminate, scaberulous, glabrous. Spikes very slender, rachis glabrous.
Spikelets reddish, callus shortly bearded; gl. I chartaceous, dorsally smooth; II
membranous, subacute, keel above and margins ciliate; III usually 0, if present
male or neuter; palea larger than its gl, oblong, obtuse, rather shorter than gl I,
membranous, 2-nerved, ciliate; IV smaller than its small subquadrate 3-4-toothed
palea.

18. P. grata, Hack. Monogr. Androp. 175; nodes of stem pubescent, leaves sessile, spikes few or many densely fascicled, joints subclavate

shortly densely ciliate, spikelets  $\frac{1}{6}-\frac{1}{6}$  in. oblong, gl. I dorsally channelled keels rigidly ciliate towards the truncate or 2-toothed tip, II mucronate or aristulate, III 0, palea ovate-lanceolate bisexual ciliate, IV minute 2-toothed, awn long or short, palea small ovate. P. ciliata, Nees in Pl. Meyen. 186. PP. montana, Nees ex Steud. Syn. Gram. 409. Ephebopogon, gratus, Nees mss. ex Huck. I. c.

SIKKIM HIMALAYA, the KHASIA and MISHMI HILLS, alt. 1-5000 ft., Griffith, &c.-DISTRIB Java, China.

Stem rather stout, 3-5 ft., pubescent or scaberulous below the nodes. Leaves 4-8 by  $\frac{1}{3} - \frac{3}{3}$  in , line ir, setaceously acuminate, scaberulous and sparsely hairy; sheath bearded at the nodes; ligule obscure Spikes  $2\frac{1}{2} - \frac{1}{4}$  in., pale or dark, joints =  $\frac{3}{3}$  spikelet, rather longer than the pedicels; gl. I dorsally smooth or scaberulous —This revembles P. eucnemis more than any other species, but has more numerous and darker spikes with more slender joints, and the nodes are pubescent. In some spikelets I find no gl III or its palea, only an ovary and the citate palea of gl. IV.

?Var. hirsuta; leaves \(\frac{1}{4}\) in. broad pubescent, sheath clothed with very long spreading and reflexed hairs, gl. IV all but reduced to the awn. Pegu, Kurz.

19. P. ciliata, Trin. in Mem. Acad. Petersb. Ser. vi. ii. (1833) 306; leaves sessile, spikes very many, joints slender compressed rather shorter than the spikelets shortly ciliate, spikelets  $\frac{1}{5}$  in. narrow pale, gl. I lanceolate deeply grooved dorsally keels scaleral below ciliate towards the forked tip, II awned or mucronulate, III 0, palea empty or male, IV minute lanceolate or broader and 2-toothed, awn long or short, palea minute. Hack. Monogr. Androp. 176; Steud. Syn. Gram. 410. P. Wallichiana, Nees ex Steud. l.c.; Thw. Enum. Pl. Zeyl. 369; Trim. Cat. Ceyl. Pl. 107. P. lancea & laxa, Nees ex Steud. l.c. P. tristachya, Thw. l.c. 368 (in part). Andropogon biaristatus, Steud. l.c. 379. A. fasciculatus, Linn. Sp. Pl. 1047.—Andropogon, Wall. Cat. n. 8815 B, 8822, 8823.—Batratherum,? Wall. l.c n. 8831 in part.

TROPICAL HIMALAYA, alt 2-5000 ft., from Kumaon to the Mishmi and Khasia Hills. Behar, on Parusnath, Clarke. NILGHIEI HILLS, Wight. CEYLON, Thwaites.

Stems 2-4 ft., much branched below, straggling, glabrous or sheaths sparsely hairy; peduncle very slender. Leaves very variable, usually small, 1-4 by ½-½ in., narrowed at both ends, finely acuminate, sometimes petioled. Spikes flaxuous. Gl. I muntlely scaberulous; II sometimes with the awn longer than itself; IV variable, as is its palea, both in breadth and length. Anthors very long.—I am puzzled with various forms of the glumes of this plant. Hickel has four varieties: a. genuma (P. ciliata, Trin, P. lancea, Nees) with linear-oblong spikelets, gl. I entire, keels pectinately ciliate, II mucrounlate, IV 2-toothed long awned;—b. laza (P. laxa, Nees) with linear-lanceolate spikelets, gl I pectinately ciliate, II awned, IV entire long awned;—c. Wullichwaa (Nees Sp.), spikelets linear-oblong, gl. I entire rigidly pectinately ciliate, II long-awned, IV entire, awn imperfect;—d. seminuda, spikelets linear-lanceolate, gl. I bimucronate, keels scabrid, II long-awned, IV entire, awn imperfect.—Ceylon (C.P. 411 in part).

20. **P. monantha**, Nees ex Steud. Syn. Gram. 410; very slender, spikes 4-6 slender flexuous joints shorter than the spikelets subclavate, spikelets  $\frac{1}{12},\frac{1}{10}$  in, 1-fld., gl. I narrow ciliate dorsally channelled, II truncate apiculate, III 0, IV minute rounded 2-toothed, awn about twice as long as the spikelet, palea very minute ovate. Hack. Monogr. Androp. 174. P. miscantha (error for monantha), Herb. Ind. Or. Hf. & T.—Andropogon, Wall. Cat. n. 8819.

SUBTROPICAL HIMALAYA; Garwhal, alt. 5000 ft., Duthre. SIKKIM TERAI,

J.D.H. KHASIA HILLS, alt. 4000 ft., J.D H. & T.T. BURMA, Thongdong,

Wallich; Rangoon, M. Lelland; King's Isld., Helfer.

Stems 1-3 ft., nodes naked. Leaves 3-6 in., base contracted, flaccid. Spikes 3-6, 2-4 in. long, very slender, pale green or yellowish brown; joints compressed, broader upwards, ciliate. Glumes usually widely spreading; I subacute or narrowly truncate, keels scaberulous or shortly ciliate above; II with villous margins towards the mucronate or aristulate tip; IV very minute, rounded. Anthers linear, half as long as the gl. or more.—Resembles P. ciliata, but the spikelets are much smaller.

21. **P. delicatula**, Hook. f.; stem very slender vaguely geniculately branched leafy, leaves linear-lanceolate acuminate base very narrow, spikes 3-5 fascicled slender pale, joints linear, margins shortly ciliate, spikelets  $r_{12}^{1}$ - $r_{10}^{1}$  in., callus stellately bearded, gl. I thin linear-oblong truncate dorsally convex shining, keels ciliate above the middle, II apiculate keel ciliate, III 0, IV awn simple or minutely dilated at the base.

PEGU, M'Lelland, Kurz.

Stems 1-2 ft., straggling, as thick as a sparrow's quill or less, smooth. Leaves  $2\frac{1}{2}$ -5 by  $\frac{1}{4}$ - $\frac{1}{2}$  in., flat, thun, sparsely ciliate chiefly towards the base, tip capillarv, margins smooth, base a mere point, midrib slender; sheath very slender; ligule minute. Spikes  $2-\frac{1}{2}$  in., erect, flexuous, pale green, joints truncate. Gl. I. of sessile spikelet 0-5-nerved, tip more or less 2-toothed; II obtuse, 3-nerved; IV awn capillary about = the spikelet. Pedicelled spikelet like the sessile or reduced, awned or not, male or neuter. Stamens 3, imperfect only seen, filaments short.

- \*\* Triandrous, anthers minute, filaments very long.
- 22. **P. imberbis**, Nees ex Steud. Syn. Gram. 410; stem very slender grooved, spikes solitary or few and racemose very slender, joints compressed, spikelets  $\frac{1}{6}$ - $\frac{1}{4}$  in. lanceolate, gl. I narrow subtruncate keels minutely scabrid, II acute nearly glabrous, III-0, IV minute ovate-lanceolate, palea ovate, awn short. Hack. Monogr. Androp. 177; Duthie Grass. N.W. Ind. 16. P. japonica, Franch. & Sav. Enum. Pl. Jap. ii. 608 (non Mig.). P. Willdenowiana, Benth. in Journ. Linn. Soc. xix. (1881) 67. Andropogon vimineus, Trin. in Men. Acad Petersb. Ser. vi. ii. (1883) 268. Microstegium Willdenowianum, Nees ex Steud. l. c. 411.—Arthraxon, Wall. Cat. n. 8838.—Batratherum? Wall. Cat. n. 8832.

TEMPEBATE HIMALAYA; Sımla, Gamble; Nepal, Wallich; Sikkim, alt. 4-7000 ft., J.D.H., Clarke. Khasia Hills, alt. 4-5000 ft.—Distrib China, Japan.

Leaves narrowed to the base, flaccid, smooth or subscaberulous. Spikes 1-3 in., not fascicled, green, joints more or less ciliate, hardly clavate; callus naked; gl. I concave dorsally, 2-6-nerved, nerves sometimes anastomosing; II 1-3-nerved; awn of IV sometimes capillary, and very short (var. Willdenomiana, Hack.); sometimes (var. genuina, Hack.) it is longer, stouter, with a twisted base.—Very variable in size; small Nepal specimens have filiform stems 6-12 in., with oblong-lanceolate acute leaves an inch long, and solitary spikes; some large Khasian specimens have stouter much branched stems 2-3 ft. long, with acuminate linear-lanceolate leaves 3-6 in. long, and 6-7 spikes.—The minute persistent didymous anthers are those of Arthrason, and differ from those of all other Indian species of Pollinia.

- \*\*\* Drandrous, anthers linear-oblong.
- 23. P. nuda, Trin. in Mem. Acad. Petersb. Ser. ii. (1833) 307; very slender, spikes few racemed very slender, joints slender terete, spikelets \(\frac{1}{2}\)-\(\frac{1}{6}\) in. narrowly lanceolate, gl. I biouspidate very narrow keels scaberulous, II acuminate, III as long as II hyaline ciliate or 0, IV lanceolate, palea

minute truncate, awn short. Hack. Monogr. Androp. 178; Steud. Syn. Gram. 410. P. japonica, Miq. Ann. Mus. Lugd. Bat. ii. 290. Leptatherum Royleanum, Nees in Proc. Linn. Soc. i. (1841) 93; Franch. & Sav. Enum. Pl. Jap. ii. 609.—Batratherum? Wall. Cat. n. 8831 in part.

TEMPERATE HIMALAYA; from Chamba to Upper Assam, alt. 4-7000 ft (to 10,000 in Kumaon), Khasia Hills, alt. 4-5000 ft., Griffith, &c.-Distrib.

China, Japan, S. Africa.

Stem 2-3 ft., grooved. Leaves 1-4 in., lanceolate, very variable in breadth, acuminate, flaccid; sheath hairy; ligule glabrous. Spikes 3-5, rarely more, 1-4 in. long, flexnous, green; joints longer or shorter than the spikelets, glabrous or ciholate. Spikelets sometimes distant, callus nearly naked or villous; gl. I rarely truncate or obtuse, often strongly forked, dorsally concave, glabrous or most minutely scaberulous, margins rarely ciliate; II nearly glabrous; III if present narrow, glabrous or sparsely ciliate, nerveless; IV variable in size, never = ½ III, 3-nerved.

#### EXCLUDED SPECIES.

P. JAPONICA, Benth. ex Duthre Grass. N.W. Ind. 16.—Duthre gives this grass which is no doubt Eurranthus fulrus, as a native of the Panjab and N.W. Himalaya up to 9000 ft. I find no authority for the name. P. japonica, Franch. & Sav. is P. imberbis, Nees, and P. japonica, Miq. is P. nuda; both are Japanese and Himalayan plants. There is also Eulaha japonica, Trin. (Mischanthus sinensis, Anderss.), which is not Himalayan.

### 35. SACCHARUM, Linn.

Tall perennial grasses. Infl. a large silky much and densely branched panicle, with spreading at length erect articulate capillary branches and branchlets (spikes). Spikelets minute, awnless, 1-fid, binate, a sessile bisexual and pedicelled, iem., rarely both pedicelled and bisexual. Glumes 4, all membranous, or I strongly chartaceous, or I and II rarely coraceous; III empty; IV shortest, rarely 0; palea hyaline nerveless or 0. Lodicules cuneate. Stamens 3. Stigmas laterally exserted. Grain oblong.—Species about 12, tropical, chiefly Asiatic.

- Sect. I. Eusaccharum. Rachis of spike fragile. Spikelets of each pair subequal, sessile and pedicelled, both fertile. Stem solid.
- S. OFFICINARUM, Linn. Sp. Pl. 54; stem solid glabrous below the panicle, upper leaves long margins scabrid, joints of spikes and pedicels glabrous, hairs of callus about twice as long as the spikelet, gl. I glabrous subchartaceous, IV very narrow or 0, palea small lanceolate. Roab. Fl. Ind. i. 237; McFad. in Hook. Bot. Misc. i. (1830) 95, t. 26; Steud. Syn. Gram. 405; Hack Monogr. Androp. iii. 111; Miq. Fl. Ind. Bat. iii. 507. Morris in Journ. Linn. Soc. xxviii. (1890) 197, t. 23. S. sinense, Roxb. l. c.

Cultivated in the hotter parts of India.—Native country unknown. For history and cultivation of the sugar-cane in Iudia see Watts' "Dictionary of the Economic Products of India," and for its origin A. de Candolle "L'Origine des Plantes Cultivées."

1. S. spontaneum, Linn. Mant. ii. 183; stem silky below the panicle, upper leaves long margins smooth, hairs of callus many times longer than the spikelet, gl. I thickened below, IV usually 0, palea ciliate. Road. Fl. Ind. i. 235; Kunth Enum. Pl. i. 475, Suppl. 384; Wight Cat. n. 1682; Griff. Notul. iii. 73, Ic. Pl. Asiat. t. 139, f. 63; Dalz. & Gibs. Bomb. Fl. 304; Thw. Enum. Pl. Zeyl. 369; Trim. Cat. Ceyl. Pl. 106.

Aitchis Cat Panjab. Pl. 172; Duthie Grass. N.W. Ind. 15, Indig. Fodd. Grass. 57, Fodd. Grass. N. Ind. 25; Steud Syn. Gram. 405; Hack Monogr. Androp. 113; Anderss. in Evers. Vet. Akad. Handl. Stockh. (1885) 156; Mig. Fl. Ind. Bat. iii. 512. S. ægyptiacum, Willd. Enum. Hort. Berol. i. 82; Boiss. Fl. Orient. v. 454. S. bengalense, Boga, Casi, Lola & tenuius, Herb. Ham. ex Wall. Cat. n. 8854. S. biflorum, Forsk. Fl. Æg. Arab. i. 16. S. caducum, Palisotii & speciosissimum, Tausch in Flora (1836) 527; Steud. l. c. 406, 405, 407. S. canaliculatum, Roxb. l. c. 246; Wight Cat. n. 1682; Duthie Grass. N.W. Ind. 14; Steud. l. c. 406. S. chinense, Nees in Hook. & Arn. Bot. Beech. Voy. 241. S. Glaza, Reinw. ev Blume Gew. Buitenz. 38. S. insulare, Brongn. Voy. Cog. Bot. 99; Steud. l. c. 406. S. Klaga, Jungh. ex Tydschr. Nat. Gesch. vii. 296; Steud. l. c. (Klagha). S. punctatum, Schum. Besch. Pl. Guin. 46. S. propinquum, Steud. l. c. S. spontaneum, var. Klaga, Trin. Fund. Agrost. t. 15, p. 1-6. S. semidecumbens, Roxb. l. c. 236, Duthie l. c. Steud. l. c. 406; Wall. Cat. n. 8854. A. Imperata spontanea, Beauv. Agrost. 8; Roem. & Sch. Syst. ii. 289; Mig. Fl. Ind. Bat. iii. 512.—Saccharum, Wall. Cat. n. 8854.

Throughout the warmer parts of INDIA and CEYLON, ascending to 6000 ft. in the Himalaya.—DISTRIB. S. Europe and warm regions of the Old World. East Australia.

Stem 5-20 ft., erect from a stout rootstock. Leaves erect, very long, narrow, margins convolute or incurved; mouth of sheath woolly; ligule membranous. Panicle 1-2 ft.; branches whorled, spreading; branchlets fragile; joints filiform, dorsally long-cilate. Spikelets  $\frac{1}{2}-\frac{1}{4}$  in., lanceolate; gl. I 2-nerved; II lanceolate, subkeeled; III ovate-lanceolate, subacute, ciliate; IV very variable.—Hackel recognized two subspecies and several varieties of them.

Subsp. indicum; slender, leaves narrow, ligule ovate subacute, spikes slender lax-fld., spikelets  $\frac{1}{8}$ - $\frac{1}{6}$  in. 4-6 times shorter than the snow-white villi.—All parts of India.

Subsp. egyptiacum; slender, leaves broadly linear, ligule truncate, spikes stouter more dense-fid., spikelets longer  $\frac{1}{6}-\frac{1}{4}$  in, villa shorter.—Almost confined to Africa, except var. nepalense, with spikelets only  $\frac{1}{6}$  in.—N.W. India, Royle (n. 197).

S. arundinaceum, Retz. Obs. iv. 14; stem glabrous below the panicle, upper leaves long margins hispidly ciliate, joints and pedicels glabrous or ciliate, hairs of callus silky much shorter than the spikelet, gl. I chartaceous acuminate dorsally villous, IV broadly lanceclate. Kunth Enum. Pl. i. 475; Hack. Monogr. Androp. 117; Steud. Syn. Gram. 407. PS. benghalense, Retz. l. c. 16. S. ciliare, Anderss. in Œvers. Vet. Akad. Handl. Stockh. (1855) 155; Hack. l. c. 118 (excl. vars. β. γ.). S. exaltatum, Roxb. Fl. Ind. i. 245; Wight Cat. n. 1681; Grah. Cat. Pl. Bomb. 239; Steud. l. c. S. Moonja, Royle Ill. Himal. Pl. 416. S. Munja, Roxb. l. c. 246. S. procerum, Roxb. l. c. 243; Steud. l. o; Trim. Cat. Ceyl. Pl. 106; Duthie Grass N.W. Ind. 15. S. Sara, Roxb. l. c. 244; Kunth l. c.; Steud. l. c. 406: Aitchis. Cat. Panjab. Pl. 172; Duthie Grass N.W. Ind. 15, Indiq. Fodd. Grass. t. 50, Fodd. Grass. N. Ind. 15; Boiss. Fl. Orient. v. 453; Hack. l. c. 118; Wall. Cat. n. 853. N. D. S. Surpata, Hb. Ham. ex Wall. Cat. 8853 D.—Saccharum, Wall. Cat. n. 8552, 8853 —Rheede Hort. Mal. xii. t. 46.

Throughout the Plains and low Hills of India. CEYLON, at Colombo, Trimen. —DISTRIB. China.

Perennial. Stem 10-20 ft. erect from a stout rootstock, branching after the second year. Leaves 3-5 ft. by 2-3 in., broadest about the middle, tapering to a slender point, midrib white; sheath bearded about the mouth; ligule short, harry.

Panicle 1-2 ft., erect, ovoid or oblong; branches half-whorled, clothed with soft cream-colrd. rarely purplish hairs. Spikes 1-3 in., rachis capillary. Spikelets \( \frac{1}{10} \) in., lanceolate, pale green violet or brownish; gl I dorsally flat or depressed nerveless except the keels; II lanceolate, shortly accuminate; III oblong-lanceolate; IV mucronate—Hackel includes under S. ciliare, S. Griffithii, Munro, which is regarded by Dr. Stapf and myself as an Ericanthus, gl. IV being clearly awned. S. benghalense is a doubtful plant, wanting, according to Hackel, in Retz's Herbarium.

3. S. Narenga, Ham. in Wall. Cat. n. 8856; stem slender silky below the panicle, nodes bearded, leaves scabrid above uppermost subulate, branchlets of panicle clothed with purple hairs, pedicels clavellate hispidulous, hairs of callus rigid, gl. I coriaceous glabrous or hairy below, II oblong coriaceous tip membranous. Hack Monogr. Androp 119; Duthie Grass. N.W. Ind. 14 Eriochrysis Narenga, Nees ex Steud. Syn. Gram. 411; Aitchis. Cat. Panjab Pl. 172.—Saccharum, Wall. Cat. l. c.

TROPICAL HIMALAYA, from Garwhal, alt. 3-4000 ft., to the Khasia Hills, Upper and Lower Bengal, Assam, Silhet, Central India, and Burma.—Distrie. Tonkin, China.

Stem 6-8 tt.; internodes often longer than the sheaths, nodes stellately bearded. Leaves 1-2 ft. by \(\frac{1}{2}\) in \(\text{lnear}\), base narrow, flat, sheath with tubercle-based hairs; ligule rounded. Panicle 12-18 in., nairow; rachis caberulous, bearded at the nodes; branches 2-4-nate, appressed to the fragile rachis, branchlets fascicled. Synkelets \(\frac{1}{10}\) in., callus minute, hairs longer or shorter than the spikelet; gl I ciliolate; IV linear-oblong, ciliate—Hackel has two varieties: a. genuinum, Himalayan, with gl. I and II of the sessile spikelet obtuse, glabrous; \(\beta\). Khasianum, with the corresponding gl. subacute, densely hairy below.

- Sect. II. Sclerostachya (Anderss.). Rachis of spike tenacious. Both spikelets of each pair pedicelled. Stem fistular.
- 4. S. fuscum, Roxb. Fl. Ind. i. 236; stem stout silky or villous below the panicle, rachis of panicle villous, spikes nodding, hairs of callus about the length of the oblong or obovoid spikelets, gl I obtuse, keels ciliate, III and IV ciliate. Hack. Monogr. Androp. 121; Kunth Enum Pl. i. 474, Suppl. 385; Steud. Syn. Gram. 406; Duthie Grass. N.W. Ind. 14. S. Modhara, Ham. in Wall. Cat. n. 8855 C Tricholæna? fusca, Schult. Mant. ii. 164. Eriochrysis fusca, Trin. in Mem. Acad. Petersb. Ser. vi. (1833) II. 315; Steud. I.c. 411. E. fusca & attenuata, Nees ex Steud. l. c. Miscanthus fuscus, Benth. in Journ. Linn. Soc. xix. (1881) 65.—Saccharum, Wall. Cat. 8855.

Upper and Lower Gangetic Plains, Assam, the Khasia Hills, the Western Ghats, and Burma.

Stem 5-8 ft. or more, as thick as the little finger. Leares 3-4 ft. by 1-2 in., linear-lanceolate, rigid, glabrous, margins scabrid; margins of sheath fimbriate; ligule rounded. Panicle 1-2 ft, narrow, branches wholled or fascicled or subsolitary, nodes bearded; spikes or branchlets nodding, slender, flexuous; joints trigonous, glabrous. Spikelets \( \frac{1}{2} \) in., brown, upper and lower alike; gl. I entire, mergins narrowly inflexed, dorsally flat smooth shining; II subacute, keeled, 1-nerved; III ovate-oblong, obtuse, nerveless, ciliate above; IV like III but shorter, ciliate with rigid hairs; palea much shorter ovate, ciliate. Grain obovoid, smooth, brown.

5. S. Ridleyi, Hack. in Estr. Bot. Zeitschr. xli. (1891) 6; stem glabrous below the long narrow panicle, rachis of panicle glabrous, spikes erect very long filiform lax-fid., hairs of callus & the length of the oblong-

lanceolate spikelets, gl. I 2-toothed keels minutely spinulous, III and IV pectinately ciliate with very long hairs.

MALAY PENINSULA; Pahang, Ridlen.

Stem several feet high. Leaves 2-3 ft. by \( \frac{1}{3} - \frac{1}{3} \) in., linear, rigid, green, glabrous, margins scabrid; sheath terete, glabrous; ligule very short, truncate. Panicle 2 ft. long, erect; rachis angular, subgeniculate at the distant bearded nodes; branches fascicled, very long, filiform; spike 3-5 in., firm, flexuous, lax-fid, glabrous except the bearded axils; joints and pedicels slender, glabrous, terete. Spikelets both pedicelled equal and perfect, \( \frac{1}{3} \) in. long, yellowish-brown; pedicel of lower = \( \frac{1}{3} \) the length of the upper which is about \( \frac{1}{3} \) shorter than the joint; gl. I chartaceous, dorsally flat, sides incurved and base sparsely hairy, 2-3-nerved besides the keels; II chartaceous, acute, 3-nerved, sparsely hairy; III nearly equal II, nerveless, margins incurved the long hairs crossing; IV rather shorter, broadly ovate, nerveless, its long hairs up-curved; palea variable, small or minute, ciliate.

#### DOUBTFUL SPECIES.

S. BRUNNEUM, Desv Opusc. 65, is a species of Tricholæena, according to Hackel (Monogr. in Index, p 707), but as that genus is suppressed and the only Indian plant referred to it is S. fuscum (q v.), it follows that S. brunneum may be that plant, and if so Desvaux's name has priority.

### 36. ERIANTHUS, Michx.

Habit and characters of Saccharum, but gl. IV awned, rarely awnless.—Species about 16, temperate and tropical.

I find no characters whereby to distinguish Erianthus from Saccharum except that given above, which is all but illusory, and a re-examination of both genera may lead to a better disposition of their species under two or more genera or sections. Pollunia differs chiefly in the digitate spikes (see E. fastigiatus).

- A. Lower branches of the panicle much shorter than the rachis.
- \* Panicle decompound; ultimate branchlets (spikes) very short, of 3-4 joints; awn of gl. IV short or obsolete.
- 1. E. Ravennæ, Beauv. Agrost. 14; leaves flat, ligule very short, panicle oblong, hairs of callus as long as the gls., spikelets \( \frac{1}{6-\frac{1}{4}} \) in. linear-lanceolate, gl. I membranous lanceolate acuminate tip 2-mucronate keels subspinulosely scabrid, IV rather shorter than I ovate-lanceolate narrowed into a slender awn of its own length or shorter. Kunth Enam. Pl i. 479, Suppl. 389; Hack. Monogr. Androp. 139; T. Nees Gen. Fl. Germ. Monocot. n. 90; Reichb Ic. Fl. Germ. t. 55; Ledeb. Fl. Ross, iv. 475, Boiss. Fl. Orient. vi. 455; Duthie Grass. N.W. Ind. 15, Fodd. Grass. N. Ind. 26. E. jamaicensis, Anderss. in Evers. Vet. Akad. Handl. Stock. (1855) 163. Saccharum Ravennæ, Murray Syst. Ed. xiii. 88; Sibth. & Sm. Fl. Graec. i. 38, t. 52; Steud. Syn. Gram. 48. S. jamaicense, Trin. in Mem. Acad. Petersb. Ser. vi. ii. (1833) 312. Andropogon Ravennæ, Linn. Sp. Pl. Ed. II. 1481, Host. Gram. Austr. iii. 1, t. 1. Bipidium Ravennæ, Trin. Fund. Agrost. 169.

WESTERN HIMALAYA and WESTERN TIBET, alt. 6-9000 ft., from Kashmir to Kumaon, the Panjab and Upper Gangetic Plain, from the Indus to Delhi.—DISTRIB. Westward to the Mediterranean.

Stem 6-10 ft., nodes glabrous. Leaves 2-3 ft. by 1-1½ in., linear, scaberulous on both surfaces, bearded at the base with golden hairs, margins scabrid; midrib broad;

sheath hairy; ligule sukuly villous. Panucle 1-3 ft., erect or inclined, greyish-white with silkily villous hairs; spikes (terminal branchlets) about ½ in., joints and pedicels filiform, half as long as the spikelets or more, ciliate with long hairs. Spikelets pale; gl. I with one or both margins incurved, nerves 1-3 between the keels; II rather longer, acuminate or aristulate, 3-nerved, keel scabrid; III lanceolate, ciliate, 1-nerved, hyaline; IV glabrous or ciliolate, 3-nerved, rarely awnless; palea shorter, ovate-lanceolate, glabrous. Pedicelled spikelet, gl. I strongly 2-3-nerved, villous below as is gl. II.—A very variable grass in stature, colour of the hairs of the panicle, size of the spikelets, and length of the awn.

Var. purpurascens, Hack. l. c.; spikelets more or less tipped with violet or purple.

E. purpurascens, Anderss. l. c. 161.—Common in N.W. India.

2. E. Griffithii, Hook. f; leaves very narrow rigid semiterete concave above, ligule long, panicle oblong very pale, callus densely villous with spreading hairs as long as the lanceolate acuminate or acute spikelet, gl. I and II dorsally villous, keels spinulose, IV ovate-lanceolate ciliate narrowed into the short awn. Saccharum Griffithii, Munro ex Aitchis. in Journ. Linn. Soc. xix. (1882) 191 (name only). S. ciliare, var. B. Griffithii, Hack. Monogr. Androp. 119. S. Sara, Artchis. l. c. ex Hack. l. c.

PESHAWUR, Stewart. WESTERN TIBET; below Rondu, Thomson .- DISTRIB.

Affghanistan, Beluchistan.

Stem tall, tufted, glabrous, solid, as thick as a swan's quill, quite glabrous, pale, polished. Leaves 2-3 ft. by 1-1 in., thickly corinceous, rigid, quite smooth, dorsally rounded, upper surface concave, margins scaberulous; sheath smooth, polished, shining; ligule long, ciliate with long hairs. Panicle 6-12 in., contracted, thyrsiform, inclined, pale yellow when dry; rachis glabrous; lower branches 1-2 in., joints about 1 as long as the spikelets and pedicels villous with long pale hairs. Spikelets pale, often tipped with purple; callus hairs about as long as the spikelets, or shorter, white or pale brownish; gls. 1 and II subequal; I 3-nerved, margins narrowly incurved, scabrid; II rather longer, acuminate; III lanceolate, 1-nerved, hyaline, margins long-ciliate; IV as long as III, 3-nerved, narrowed into a short included or shortly exserted awn, palea much shorter than the gl., more or less ciliate.—Referred to Saccharum culture (arundinaceum) by Hackel, from which the awned gl. IV at once distinguishes it, and much more closely allied to Erianthus Ravennæ, differing in the pale straw-colour of its stem, leaves and panicle, rigid 1-terete leaves concave on the upper surface, long ligule, and dorsally harry gl. I and II. Griffith, Itinerary Notes, 317 (n. 1193) describes this as a large grass, 6-7 ft. high, with white spikes, very common at 5000 ft. at Jugdulluk (Affghanistan).

3. **E. elephantinus**, *Hook. f.*; gigantic, leaves broad flat, panicle very large supradecompound, spikelets  $\frac{1}{12}-\frac{1}{10}$  in., hairs of callus as long as the gls. or longer, grey or purplish, gl I narrowly ovate-lanceolate dorsally sparsely hairy keels scabrid, II lanceolate acuminate subaristate 1-nerved, IV shorter than I ovate-lanceolate 3-nerved eciliate narrowed into a shortly exserted awn.

Assam, Griffith, Simonds.

Stem very tall and stout, as thick as the middle finger below the panicle, quite smooth, glabrous. Leaf (upper) two or more feet long by \(\frac{3}{2}\) in. broad, quite smooth on both surfaces, margins serrulately scabrid; sheath several feet long; ligule of long straight hairs. Panicle 14 in. long, oblong, inclined; rachis as thick as the little finger below, glabrous, polished; lower nodes 4 in. apart, branches numerous, lower fascicled and half-whorled 6-8 in. long. Spikes few-fld., capillary, fragile; joints and pedicels half as long as the spikelets or longer, villously ciliate, tops cupular. Spikelets ovate-lanceolate, pale; gl. I and II subequal, membranous; I lanceolate, acuminate, tip minutely 2-toothed, dorsally flat, with one median nerve, margins narrowly incurved; II ciliate; III as long as I, hyaline but stiff, 1-nerved, ciliate, margins incurved; IV shorter than III, quite glabrous; palea nearly as long as the

- gl., lanceolate from a crowded concave base.—Evidently a gigantic species of which I have seen only one specimen of leaves and panicle from the Calcutta Herbarium, and a scrap of a panicle from Griffith.
- \*\* Branches of panicle long simple much or sparingly divided; spikes many-jointed; awn of gl. IV more than twice as long as the spikelet, rarely (in sikkimensis and chysothria) shorter or 0.
  - † Gl. IV entire, narrowed into the awn.
- 4. E. fulvus, Nees ex Steud. Syn. Gram. 409; stem silkily villous below the long narrow silkily villous panicle, spikelets  $\frac{1}{10}$ ,  $\frac{1}{12}$  in. narrowly oblong much shorter than the fulvous purplish or reddish hairs of the callus, gls. I and II hyaline above the middle, IV very narrow. Hack. Monogr. Androp. 147. E. rufipilus, Griseb. in Goett. Nachr. (1868) 93; Duthie Grass. N.W. Ind. 15. E. japonicus, Herb. Strach. & Winterb. n. 2, & Herb. H. f. & T. Saccharum rufipilum, Steud. l. c.—Erianthus, Wall. Cat n. 8849.

TEMPERATE HIMALAYA; from Kashmir to Sikkim, alt. 5-7000 ft. Khasia and Naga Hills, alt 5-5500 ft.

- Stem 6-8 ft., stout; nodes glabrous or pubescent. Leaves 2-3 ft. by 1-1 in., flat, glaucous and scaberulous beneath and on the margins; margins of sheath harry; ligule rounded, cilate. Panacle 8-18 in., erect, decompound; rachis villous; spikes crowded; joints 8-10 and pedicels filiform, villous, half as long as the spikelets or more. Spikelets concealed by the hairs of the callus and joints, usually brownish; gl. I chartaceous below, tip suddenly acute, quite entire, 1-3-nerved, dorsally flat, glabrous; margins not incurved or below the tip only, ciliolate above; II rather longer, acute or 2-mucronate, glabrous, margins cilate; III lanceolate, ciliate, acuminate or shortly awned; IV much shorter, ovate-lanceolate, glabrous, 1-nerved; awn 1-1 in., palea as long as the gl. or shorter or 0? Pedicelled spikelets hardly different from the sessile.—The rame fullvus is not appropriate.
- 5. **E. sikkimensis**, Hook. f: stem very slender silkily villous below the very narrow stiff panicle, spikelets  $\frac{1}{5}$ — $\frac{1}{5}$  in. lanceolate longer than the white hairs of the callus, gl. I tip broadly 2-fid sides villous with long hairs hyaline above the middle, IV very uarrow.

SIKKIM HIMALAYA; Lachen Valley, alt. 6000 ft., J. D. H.

Stem 1-2 ft., as thick as a dove's quill. Leaves narrow, rigid, flat, hairy towards the base, margins scabrous; sheaths glabrous or sparsely pubescent above; ligule rounded ciliate. Panucle 4-6 in., sparingly branched; spikes strict, erect, appressed to the villous rachis, joints and pedicels nearly as long as the spikelet, glabrous. Spikelets erect; gl. I oblong-lanceolate, corraceous below the middle, dorsally glabrous, sides with long silky hairs, tip bifd with a broad sinus, margins infexed, keels scabrid, nerves 5 between the scabrid keels vanishing upwards, tips often anastomosing; II chartaceous below the upper hyaline third, keeled, 3-nerved, margins ciliate; IV nearly = III, linear-lanceolate, 1-nerved, subciliate, narrowed into a short straight awn; palea nearly = the gl. subulate-lanceolate ciliolate.—Specimens very imperfect.

- ++ Gl. IV 2-toothed or 2-lobed.
- § Gl. I. dorsally glabrous or nearly so.
- 6. E. filifolius, Nees ex Steud. Syn. Gram. i. 409; stem pubescent below the narrow panicle, leaves filiform, spikelets \( \frac{1}{2} \frac{1}{2} \) in lanceolate rather longer than the hairs of the callus, gl. I of sessile spikelet membranous acute keels scabrid, IV entire or minutely 2-toothed, awn much longer than the spikelet, gl. I of pedicelled spikelet 6-7-nerved. Hack. Monogr. Androp.

146. Saccharum filifolium, Steud. Syn. Gram. 409; Duthie Grass. N.W. Ind. 14.

TEMPERATE WESTERN HIMALAYA, from Chamba to Kumaon, alt. 5-8000 ft., Roule, &c

Stem 2-3 ft., rootstock woody, nodes pubescent. Leaves 8-12 in., rigid, glabrous, convolute below, narrowed to the hair, tip capillary; sheath glabrous; ligule very short, obtuse, ciholate. Panicle 6-8 in., red-purple; joints and pedicels = about half the spikelet, ciliate. Spikelets surrounded with dense white hairs, gl. I minutely 2-toothed, margins broadly inflexed, dorsally glabrous with 3-4 unequal intracarinal nerves; II like I, 3-nerved, keel smooth; III lanceolate, 2-mucronulate, sub 2-nerved, margins inflexed ciliate; IV shorter, linear-lanceolate, 1-nerved, glabrous; palea short, lanceolate, glabrous.

7. E. versicolor, Nees ex Steud. Syn. Gram. 409; stem glabrous below the lanceolate panicle, leaves flat, spikelets  $\frac{1}{4} - \frac{1}{4}$  in linear-lanceolate concealed by the dense white hairs of the callus, gl. I of sessile spikelet variegated chartaceous below reddish and membranous above, keels smooth, IV cuspidately 2-toothed ciliolate, awn twice as long as the spikelet or more, gl I of pedicelled spikelet 3-nerved between the keels. Hack. Monogr. Androp. 144; Duthie Grass. N.W. Ind. 16.

TEMPERATE HIMALAYA; from Kashmir to Sikkim, alt. 2500-7009 ft.

Stem tall, pubescent below the nodes. Leares 8-16 by  $\frac{1}{8}-\frac{1}{6}$  in., smooth, marging scabrid; sheath glabrous or mouth sparingly hairy; ligule broadly ovate, glabrous. Panicle 8-10 in., rachis and bianches opposite, glabrous, axils bearded; joints of spike 5-7 and pedicels  $\frac{2}{8}$  as long as the spikelet or longer, shortly ciliate with stiff white hairs. Spikelets usually green and violet below the middle, reddish above it; gl. I tip subacute obtuse or 2-denticulate, nerves 2-3 between the keels vanishing upward; II linear-oblong, entire, 1-nerved, keel scaberulous; III linear-oblong nerveless, tip ciliolate; IV =  $\frac{1}{4}$  II, cuspidately 2-toothed; palea  $\frac{1}{2}$  shorter, linear-lanceolate acute, glabrous.—I very much doubt this being distinct from E. filifolius and the following; and amongst the numerous specimens of Himalayan Erranthi which I have examined, and which must include these, I find it impossible to refer many with precision to any of these three.

Var. pallens, stem slightly pubescent below the pale lanceolate panicle, leaves flat, spikelets \( \frac{1}{2} \) in. oblong \( \frac{1}{2} \) shorter than the dense white hairs of the callus, gl. I membranous tip hyaline keels smooth, IV cuspidately 2-toothed ciliolate, awn 3-4 times as long as the spikelet, gl. I of pedicelled spikelet shortly 1-nerved between

the keels. E. pallens, Hack. Monogr. Androp. 145.

8. E. longisetosus, Anderss. ex Benth. in Journ. Linn Soc. xix (1881) 67; stem naked below the ovate-oblong panicle, sessile spikelets  $\frac{1}{8}$  in lanceolate equalling or rather shorter than the red-brown hairs of the callus, gl. I oblong-lanceolate chartaceous bicuspidate 2-nerved between the smooth keels sides sparsely ciliate, IV narrow 2-fid, awn 4 or 5 times as long as the spikelet, gl. I of pedicelled spikelet 6-7-nerved. Hack. Monogr. Androp. 143; Clarke in Journ. Linn Soc. xxv. (1889) 85, t. 34. E. mishmeensis, Munro mss.—Erianthus, Wall. Cat. n. 8846.

TROPICAL HIMALAYA, alt. 1-3000 ft., from Nepal to the Mishmi, Naga and

Munnepore Hills, Assam, SILHET and CHITTAGONG.

Stem 6-8 ft., stout, nodes pubescent. Leaves 1-3 ft. by \(\frac{1}{2}\)-1\(\frac{1}{2}\) in., glabrous except at the base within, many-nerved, quite smooth, base often much narrowed; sheath smooth; ligule rounded. Panicle 6-18 in., of many long densely packed solitary or binate long divided soft drooping spikes clothed with pale reddish or golden-brown hairs, rachis glabrous, joints and pedicels slender about as long as the spikelets densely ciliate with long hairs. Spikelets brown below, pale above; gl. I with rather broadly inflexed margins, II oblong-lanceolate, chartaceous, apiculate or

aristulate from a notched tip, 8-nerved, keel smooth, margins villous; III oblong, hyaline, copiously ciliate; IV variable in length, 1-nerved; palea usually half as long as the gl., very narrow.—In Journ. Lunn. Soc. l. c. the authority for the name longisetosus is by oversight given as Thos. Anderson (late Director of the Calcutta Bot. Gardens.)

- §§ Gl. I dorsally villous at the base or all over.
- 9. **E. Hookeri,** Hack. Monogr. Androp. 142; stem pubescent below the linear-lanceolate paniele, sessile spikelets !—‡ in oblong-lanceolate rather longer than the reddish hairs of the callus, gl. I chartaceous acute tip membranous dorsally flat densely villous below the middle, 1-nerved between the scabrid keels, IV obtusely 2-toothed, awn twice or thrice as long as the spikelet, gl. I of pedicelled spikelet 5-nerved villous all over.

SIRKIM HIMALAYA, alt. 1-3000 ft., J D.H., Clarke. Bhotan, Herb. Calcutta. —Distrib. Yunan.

Stem 2-3 ft, often branched below. Leaves 2-4 ft by \( \frac{1}{2} - 1 \) \( \frac{1}{2} \) in.; sheath puberulous, villous at the top; ligule rounded, cillate. Panicle 10-18 in., rachis pubescent, branches short, 2-3-nate; spikes unequal, joints and pedicels = \( \frac{1}{2} \) the spikelet, cillate with long hairs. Spikelets rusty red; gl. I villous with white hairs, margins inflexed above the middle, nerves often anastomosing; II oblong, chartaceous, 3-nerved, keel scabrid above; III shorter, lanceolate, nerveless, ciliate, tip dilated; IV awn brown subdorsally inserted; palea minute, long ciliate.—Very near E. longisetosus, and versicolor; hardly distinguishable except by gl. I being dorsally villous below the middle.

10. E. chrysothrix, Hack. in Estr. Bot. Zeitschr. xli. (1891) 6; stem rusty tomentose below the large panicle, spikes long hairy joints villous with rusty hairs, sessile spikelets  $\frac{1}{7}$  in. linear-oblong, gl. I chartaceous narrowly truncate, dorsally villous all over, IV oblong 2-fid, awn very short or 0. Saccharum longifolium, Munro ex Benth. in Journ. Linn. Soc. xix. (1861) 66 S. fallax  $\beta$ , Balansa in Journ. de Bot. (Paris, 1890) 81. Eriochrysis longifolia, Munro mss.

KHASIA and NAGA HILLS, alt. 2-4000 ft., Griffith, &c.-Distrib. Tonkin, Borneo.

- Stem 8-10 ft., as thick as the middle finger, solid, smooth. Leaves 2-3 ft., glabrous or hirsute; sheaths with tubercle-based hairs; ligule short. Panicle 1-2 ft., erect, contracted, dense-fld, sometimes rustily villous; rachis angular, hairy, fragile; spikes whorled, 2-3 in.; joints and pedicels half as long as the spikelet, villous. Spikelets brown; gl. 1 2-nerved, dorsally flat, keels ciliate; II keeled, truncate, 3-nerved; III shorter, oblong-lanceolate, ciliate; IV = \frac{1}{2} III, ovate or linear-oblong, acutely 2-fid, ciliate; awn in the cleft, \frac{1}{2} in.; pales minute, broad, truncate, ciliate with long hairs.—Very unlike any other Indian species.
  - B. Lower branches of the panicle almost as long as the rachis.
- 11. E. fastigiatus, Nees ex Steud. Syn. Gram. 409; stem silky below the panicle, spikes crowded subdigitately fascicled, spikelets \( \frac{1}{6} \) inlanceolate much longer than the white hairs of the callus gl. I chartaceous purplish-brown base dorsally and margins sparsely villous, keels above aculeolate, IV oblong or lanceolate 2-denticulate, awn terminal as long as the spikelet or longer. Hack. Monogr. Androp. 150. Saccharum fastigiatum, Steud. l. c.—Saccharum, Wall. Cat. n. 8847.

Tropical SIKKIM, the KHASIA and MISHMI HILLS, ASSAM, SILHET, CHITTA-GONG, CHOTA NAGPOBE, Clarke, BELGAUM, Ritchie.

Stem 2-8 ft., stout or slender. Leaves 1-2 by 1-1 in., linear from a narrow

base, rigid, flat, smooth, margins scabrid; sheath glabrous, mouth fimbriate; ligule very short, truncate. Panicle oblong or fan-shaped; rachis hairy; spikes crowded, lower 3-5 in. strict slender, joints many and pedicels = \frac{1}{2} spikelet or shorter, villous with long white hairs. Spikelets dark colrd. below paler above; gl. I dorsally subchannelled, scaberulous, ciliate upwards, 1-nerved between the keels; II chartaceous, lanceolate, margins hyaline, III = I, linear-lanceolate, base membranous coloured, hyaline above; IV = \frac{1}{2} II, hyaline, 3-nerved; palea small, ovate, obtuse, glabrous.—Hardly different from a Pollinia.

### UNDESCRIBED SPECIES.

E. vulpinus, Nees in Royle Ill. Pl. Himal. 417.

### 37. ISCHÆMUM, Linn.

Annual or perennial grasses. Spikelets usually 2-fld, in solitary digitate or fascicled articulate fragile spikes, binate, a sessile and pedicelled. Sessile spikelets, Glumes 4, I oblong or lanceolate, flat, with inflexed margins, truncate or 2-cuspidate, awnless; II as long as I but narrower, concave, acute obtuse or awned; III hyaline, rarely chartaceous, paleate, triandrous, palea narrow ciliate; IV hyaline, bisexual or fem., usually cleft, awned (rarely awnless), awn inserted in the cleft, or by a minute point below it, branching into 3-nerves; palea linear-lanceolate. Pedicelled spikelet, like the sessile, or broader, often imperfect. Lodicules cuneatequadrate. Anthers linear. Styles long, stigmas long or short.—Species about 40, chiefly tropical.

Ischæmum differs from Pollinia in the much larger gl. IV. of the sessile spikelet which is usually cleft into lanceolate lobes, and, except in I. angustyfoluum, in the longer palea of that gl. I find that Hackel's sectional character founded on the shape of the joints is unworkable.

- Sect. I. Euschemum. Spikes 2-3, rarely more. Gl. I of sessile spikelets dorsally flat, not deeply channelled or depressed along the messal line. (See also I. robustum.)
  - \* Margins of gl. I narrowly inflexed or incurved from base to apex.
  - † Leaves rounded at the base, sessile on the sheath.
  - § Pedicel of upper spikelet not  $\frac{1}{3}$  the length of the lower spikelets.
- 1. aristatum, Linn. Sp. Pl. 1049 (in part); perennial, leaves sessile long narrow, spikes 2-3 2-5 in., gl. I of sessile spikelet nearly flat oblong obtuse or notched with 2-4 marginal nodules or low transverse ridges, IV deeply 2-fid, awn geniculately inserted at the cleft, upper spikelet dimidiate-ovate. Kunth Enum Pl. i. 512, Suppl. 421; Hack. Monogr. Androp. 202. I. imberbe, Retz. Obs. vi. 35.—Spodiopogon, Wall. Cat. 8861 (= vars. imbricatum & elatum).

Throughout the Plains and lower Hills of India, from Sikkim and Bengal to Burma, and southwd. through the Deccan Peninsula to CEYLON.—DISTRIB. China, Malaya.

Stem 1-4 ft., stout or slender, erect or decumbent at the base, simple or branched above. Leaves 4-10 in. by \(\frac{1}{4}\)-1\frac{1}{2}\) in., finely acuminate, glabrous or silkily hairy, base rounded or narrowed rarely subpetiolate; sheath naked or hirsute; ligule short or 0. Spikes stout or rather slender, internodes much shorter than the spike-

lets, fragile. Spikelets & to nearly & in., pale or dark, glabrous to villous; gl. I from broadly oblong with a rounded tip to oblong-lanceolate, symmetrical or slightly curved or subdimidiate-oblong, upper & or & usually herbaceous nerved and with a narrow ciliate wing on one or both sides; II acute or acuminate; IV about & shorter than II, 3-nerved below the insertion of the slender pale awn, which is rarely twice the length of the spikelet; upper spikelet not awned, pedicel very short.—In Hohenacker's specimen of var. mangaloricum gl. IV is cleft & way down. In a small form from Salsette (Bombay) Jacquemont n. 374, the keel of gl. II is notched about the middle, winged and seriulate thence to the tip.

The following is Hackel's grouping of some of the more distinct forms of this variable plant. It has the advantage of bringing the authorities and synonyms into some order, but does not include all the definable forms, of which I have added

two:--

Subsp. imberbe, Hack. l. c. 203; spikelets glabrous, except the callus. I. aristatum, Burm. Fl. Ind. t. 21, f. 3 (bad). Meoschium aristatum, Beuw. Agrost. 111—Var. imbricatum; stout, erect, ligule rather long, gl. I of sessile spikelet 2-noduled on each side, of pedicelled smooth. Meoschium imbricatum, Munro mss. Andropogon imberbis, Steud. Syn. Gram 378 Bengal, the Khasia Hills, Ceylon (OP. 869)—Var. mangaloricum, Hack. l. c. 204; stout, erect, ligule short, gl. I of lower spikelet surmounted by a broad scarious claw 3-4-noduled on each side, IV deeply cleft. I. geniculatum, Hochst. in Hohen. Pl. Ind. Or. n. 184 (non Roxb.) Meoschium Arnottianum, Nees in Nov. Act. Nat. Cur. xix. Suppl. i. (1843) 198. Andropogon geniculatus, Steud. l. c.—The Concan and Malabar.—Var. fallax, Hack. l. c.; stem slender, base decumbent, ligule minute, gl. I of lower spikelets 3-4-noduled on each side. Meoschium Arnottianum, Nees in Herb. Wight. n. 3077. M. monostachys, Wt. & Arn. ex. Steud. l. c. 369. Andropogon monostachyus, Steud. l. c. Central India, the Deccan and Ceylon.

Subsp barbatum, Hack. l. c. 204; spikelets more or less villous, gl. I of lower spikelet 3-4-noduled on each side, the opposite nodules sometimes united by a low ridge. I. barbatum, Retz Obs. vi. 35; Kunth Enum. Pl. i. 513. Benth. Fl. Hongk. 425; Thwaites Enum. Pl. Zeyl. 364; Trim. Cat. Ceyl. Pl. 107. Meoschium barbatum, Beauv. Agrost. 111. Andropogon barbigerus, Steud. l. c. 376—Var. elatum Hack. l. c. 205; tall, branched, sheaths hirsute, ligule 1-4 in. Meoschium elatum, Nees ex Steud. l. c. 376. M. Neesianum, Arn. ex Steud. l. c. 375. Andropogon,

Esenbeckii, and elatus, Steud. l.c. 375, 376.

Subsp. Koenigii, *Hook. f.*; tall, very robust, stem as thick as a swan's quill, leaves 1-1½ in. broad, spikes 3 very stout 4 in. long, spikelets ½ in., gl. I of lower oblong-lanceolate acute, IV shortly 2-fid lobes narrow. I. fasciculatum, *Rottler mss.*—

Deccan Peninsula, Koenig.—Probably a distinct species.

Subsp. Rottleri, Hook. f.; stem stout much branched, spikelets 1 in. closely imbricate, gl. I of lower linear-oblong, of upper very broad broadly winged on one side nerves of both with anastomosing tips, gl. IV of lower cleft nearly to the base, awn inserted in the cleft, of upper oblong bidentate mucronate in the notch. I. barbatum, Herb. Rottler.—Probably from the Deccan. This also may be a distinct species.

2. L. rugosum, Salisb. Ic. Stirp. Rar. i. t. 1; annual, erect, leaves narrow base contracted, spikes 1-2, gl. I subdimidiately oblong obtuse very convex, coriaceous below and closely transversely ridged membranous above, IV cleft to below the middle awn geniculately inserted at the cleft dorsally lobes lanceolate. Gærtn. f. Fruct. Suppl. i. t. 181; Roxb. Fl. Ind. i. t. 320; Hack. Monogr. Androp. 206; Thvaates Enum. Pl. Zeyl. 364; Trim. Cat. Ceyl. Pl 107; Duthie Grass. N.W. Ind. 18, Fodd. Grass. N. Ind. 31; Rendle in Journ. Bot. xxxii. (1894) 103. I. Colladon, Spreng. Syst. i. 298. I. corrugatum, Herb. Hom. in Wall. Cat. n. 8864 E. I. Royleanum, Mig Fl. Ind. Bat. iii. 498; Duthie Grass. N. W. Ind. 18. I. segetum, Trin. in Mem. Acad. Petersb. Ser. vi. ii. (1883) 294. Meoschium Griffithii, Nees & Arn. in Ann. & Mag. Nat. Hist. 1. (1838) 284. M. Arnottianum, Nees,

elegans, Arn. & Nees, rugosum, Necs, & Wightianum, Nees in Nov. Act. Nat. Cur. xix. Suppl. i. (1843) 193, in Pl. Meyen. 200. M. Royleanum, Nees er Stevd. Syn. Gram. 375. M. rugosum, Wall. Cat. n. 8864. M. Wightii, Ne s in Wight Cat. n. 1719. Andropogon Arnottianus, Griffithsiæ, segetum & Tong-dong, Steud. l. c. 375, 376. Apluda rugosa, Herb. Russ. ex Wall. l. c. 8864 A. Colladon distachya, Cav. Ic. 37, t. 460.

Throughout India from the Lower Himalaya southwd, to Burma, and the Malay

Peninsula, Andaman Islds., and CEYLON. - DISTRIB. China, Malaya.

Stems 1-2 ft., tutted, nodes glabrous or puberulous. Leaves 4-10 in.; ligule short. Spikes 1-3 in., pale yellow; joints = 3 spikelets, very stout, cliate. Spikelets \( \frac{1}{2} \) in., pale yellow; gl. I veined in the upper membranous third; ridges of lower \( \frac{3}{3} \) often unbricating l.ke folds; II acute, keeled, scaberulous; III lanceolate, acute, hyaline, valeate; IV nearly = II; awn short or long, very slender, glistening, palea ovate-lanceolate. Pedicelted spikelets like the sessile, or imperfect.—Hackel has 3 vars, but I full to limit them with copious suites of specimens. There are, however, two recognizable torms; one with glabrous joints and pedicels, a glabrous or shortly harry callins, and imperfect awn, the other with more ciliate nodes and pedicels, a more bearded callus and longer awn.

3. I. magnum, Rendle in Journ. Bot. xxxii. (1894) 102; tall, stout, leaves linear-lanceolate from a narrow base, spikes 2 appressed 4-7 in. nearly glabrous, gl. I of sessile spikelet oblong-lanceolate very coriaceous and deeply transversely channelled below the middle thinner above and 3-5-nerved with one keel narrowly winged, IV ovate-lanceolate entire apiculate awn 0.

SINGAPORE; at Blakan Mate, Feilding.

Stem 6 ft., branched above, branches slender, nodes hairy. Leaves 12-20 in., finely acuminate, glabrons above, sparsely hairy beneath; sheaths above villous and scabrid; ligule \(\frac{1}{2} + \frac{1}{2}\) in., 2-auricled. Spikes stout, pale, joints 3-gonous, ciholate on the outer angle, \(\frac{1}{2} + \frac{1}{2}\) shorter than the sessile spikelet, tips very shortly bearded; pedicel of upper spikelet very short stout. Sessile spikelets \(\frac{1}{2}\) in., oblong, convex, pale vellowish polished, turnd between the transverse channels; II co iaceous, acutely keeled, margins incurved, III lanceolate, acuminate, hyaline, 3-nerved, paleate, palea as long 2-nerved; IV rather shorter, hyaline, otate-lanceolate, 3-nerved; palea as long, narrowly lanceolate, 2-nerved. Pedicelled spikelet as long as the sessile, obliquely convolute, inner margin with 2-3 nodules, outer narrowly winged.

4. **I. molle,** Hook f.; tall, stout, branched, leaves sessile, spikes 1-2 stout densely silkily villous with white hairs, joints broad half as long as the spikelets, gl. I broadly ovate-oblong obtuse smooth dorsally villous all over many-nerved, II obtuse silky keel narrowly winged from the middle upwards, IV shorter cleft to the middle, lobes acuminate ciliate, awn geniculately inserted at the cleft. I. aristatum var. intermedium, Hack. mss.

The CONCAN? Herb. Dalzell. CENTRAL PROVINCES; Chanda district, Duthie. Stem 3-4 ft., soft, solid, quite smooth, leafy. Leaves 6-10 by \(\frac{1}{2}\)-\frac{1}{2} in., finely accuminate, base rounded and cordate, sparsely hairy on both surfaces; sheaths 4-6 in., smooth, glabrous or sparingly hairy above, mouth villous. Spikes axillary and terminal, 3-5 in.; joints stout, 3-gonous or concavo-convex, cliate, tips truncate. Spikelets \(\frac{1}{2}\)-\frac{1}{6} in.; callus very short, broad; gl. I thinly corraceous, margins narrowly incurved obscurely waved at the base; II chartaceous, wing cliolate, margins cliate; III hyaline, ovate, obtuse, 3-nerved, cliate; palea as long, narrower, obtuse, 2-nerved; IV about \(\frac{1}{2}\) shorter than III, awn 2-3 times as long as the gls., golden yellow and shining with a brown column; palea like that of III but smaller. Upper spikelet smaller than the lower, awnless, pedicel = \(\frac{1}{2}\) of lower spikelet.

- §§ Pedicel of upper spikelet \ the length of the lower spikelet or more.
- 5. **I.** diplopogon, Hook.f.; annual, branching upwards, leaves lanceolate from a narrow base, upper sheaths spathiform, spikes 2 pale, peduncle flexuous, joints dorsally ciliate, sessile spikelets  $\frac{1}{2}-\frac{1}{2}$  in, gl. I oblong 2-cuspidate glabrous shining, II awned 3-nervel lateral nerves pectinately ciliate with stiff hairs above the middle, IV very short 2-fid lobes acute eciliate awned in the cleft.

BOMBAY; near Bhorkus, Woodrow.

Stems 12-18 in or more, branched from the base and upwards, smooth, stout or slender, internodes long, nodes glabrous. Leaves 4-6 by \(\frac{1}{2}\)-\(\frac{3}{2}\) in., acuminate, narrowed from below the middle to the base, dark green, rather shining above, margins smooth, nerves 3-4 pairs and midrib very slender; sheath glabrous, of upper leaves open, ligule very short, glabrous \(Peduncles\) many from the upper spathsform sheaths, solitary, flittorm; spathes 1-3 in., compressed, lanceolate. Spikes 1-1] in., compressed; pedicelled spikelets divergent, joints and pedicels = \(\frac{1}{2}\) the lower spikelets or longer, subclavate, dorsally rounded, ventrally concave. Sessile spikelets white; gl. I nerves obscure, margins narrowly incurved; II dorsally smooth, awn as long as itself; III linear-oblong, 1-nerved, eciliate, IV 3-nerved, awn \(\frac{1}{2}\) in. capillary, palea very small, oblong. Peducilled spikelets often imperfect, not awned; gl. I elliptic, 2-cuspidate, green, margins white; II acummate.

6 **I. Kingii**, Hook. f., annual, leaves ovate-lanceolate base rounded or subcordate, hairy beneath, sheaths of uppermost spathiform, spikes 2 ovate pale villous, joints and pedicels very stout densely ciliate tops 3-lobed, sessile spikelet  $\frac{1}{5}$ — $\frac{1}{5}$  in , gl. I oblong or oblong-lanceolate 2-cuspidate or 2-aristulate dorsally glabrous shining, sides bulging at about the lower  $\frac{1}{5}$  keels ciliate above, II awned dorsally rounded with a broad pencil of stiff hairs on the upper third, IV 2-fid lobes stoutly awned between the lobes.

RAJPOOTANA: Mt. Aboo, King.

Stem 10-12 in, ascending, glabrous. Leaves 1-2 by \$-\frac{1}{2}\$ in, acuminate, rather thin, margins scaberulous, midrub and nerves very slender; sheaths lax, upper open, glabrous; ligule short, membranous. Peduncks sheathed, sometimes up to the spikes, slender. Spikes 2 in.; joints shining. Sessile spikelets with a short rounded bearded callus; keels of gl. I minutely scaberulous; II scabrid, tip 2-toothed; III lanceolate 1-nerved; IV much shorter, 3-nerved, lobes triangular-ovate, eciliate; palea about as long, ovate-lanceolate, 2-nerved, eciliate; awn about 1 in. long. Pedicelled spikelets variable, much smaller; gl. I elliptic, acute, many-nerved, flat, margins n. incurved; II shortly awned, dorsally nearly naked.

7. **I.** augustifolium, Hack. Monogr. Androp. 241; base of stem woolly, leaves long narrow rigid subpungent, spikes 2-4 on axillary and terminal filiform peduncles, gl. I of sessile spikelet lanceolate 2-3-toothed dorsally convex with a tuft of hairs strongly 3-nerved margins not inflexed, II lanceolate 2-toothed aristulate, IV linear entire or 2-toothed shortly awned. Oliver in Hook. Ic. Pl. t. 1773; Kew Bulletin, 1888, 157. I. sparteum, Ham. & Wall. Cat. n. 8845. Spodiopogon augustifolius, Trin. in Mem Acad. Petersb. Ser. vi. ii. (1833) 300, Sp. Gram. Ic. t. 336. S. laniger, Nees in Boyle Ill. Himal. Pl. 416; Steud. Syn. Gram. 373. S. notopogon, Nees ex Steud l. c. Pollinia eriopoda. Hance in Journ. Bot. v. (1866) 173; Dyer in Journ. Linn. Soc. xx. (1883) 409. Andropogon binatus, Retz. Obs. vi. 21. A. involutus, notopogon & obvallatus, Steud. I. c. —Eriantho affine, Wall. Cat. n. 8845.

LOWER HIMALAYA; from Kashmir to Sikkim, ascending to 7000 ft. in Garwhal, Duthie. The Panjab. Rajpootana, on Mt. Aboo. The Satpura Hills. Behar vol. vii. on Parusnath. Central India. (Cult. in Bengal, Kurz) - Distrib. Affghanistan,

China, Philippines.

Stems  $2^{-3}$  ft, tufted, sparingly branched, slender, grooved on one side, smooth. Iteales 1-2 it. by  $\frac{1}{10^{-1}}$  in., concave or convolute, base obtuse fimbriate, margins scaberulous; sheath glabrous, old basal forming with the wool a thickened mass; ligule a ridge of hairs. Spikes 1-2 in., close together or placed apart, erect, golden or rusty villous; joints and pedicels = \frac{1}{2} the lower spikelet, slender, shortly ciliate, bearded at the base. Spikelets \frac{1}{2} \frac{1}{2} in., lanceolate, callus hairs short; gl. I subchirtaceous, margined with long rufous hairs; II rather longer, 3-5-nerved, ciliate, keel bearded below; III oblong, obtuse, tip ciliate, nerveless, paleate; palea entire or 2-lobed, tip ciliate; IV = II, 1-nerved, awn as long as the spikelet; palea short, ovate, obtuse, tip fimbriate. Pedicelled spikelets like the sessile.—Hackel points out that except for the inforescence this is more a Spodiopogon or Pollima than an Ischæmum, and should perhaps form a genus. The woolly stem-base recalls Pollinia veluting and pheothrix.

8 **I. pilosum**, Hack. Monogr. Androp. 240; tall, robust, leaves narrow, spikes 2-6 villous, gl. I of sessile spikelet lanceolate bicuspidate translucent dorsally flat or depressed hairy 6-nerved keels scabrid and ciliate, II longer keel ciliate above, IV = III oblong-lanceolate 2-fid, awn short slender inserted between the lanceolate lobes. Duthie Fodd. Grass. N. Ind. 31; Lisboa in Bomb. Journ. Nat. Hist. vi. (1891) 199. Spodiopogon pilosus, Nees ex Steud. Syn. Gram. 373; Wight Cat. n. 1692. Andropogon pilifer, Steud. l.c. A. pilosus, Klein ex Willd. Sp. Pl. iv. 920.—Andropogon, Wall. Cat. n. 8817.

AJMEER; at Neemuch, Jacquemont. CENTRAL PROVINCES, Duthie. The DECCAN

PENINSULA, Heyne, S.c.

Stem very stout, extensively creeping; stolons sheathed; branches 2-3 ft., much divided at the base, nodes glabrous. Leaves 6-12 in., flat or convolute, often wiry, coriaceous, glaucous, finely acuminate, glabrous, base and mouth of sheath bearded; ligule membranous, rounded. Spikes fascicled, \(\frac{1}{2}\)-1\(\frac{1}{2}\) in., yellow or brownish, rachis bairy, joints and pedicels slender, compressed, subclavate, shorter than the sessile spikelets, sparsely cliate Sessile spikelets \(\frac{1}{2}\)-1\(\frac{1}{2}\) in.; callus minute, bearded with long hairs; gl. I chartaceous, narrowed from the middle upwards, dorsally hairy, nerves anastomosing, margins inflexed from base to tip; II rather longer, chartaceous, laterally compressed, acuminate, 5-nerved; III linear-oblong, obtuse, ciliate above, paleate, male, palea glabrous; IV = III, 3-nerved, lobes ciliolate, awn variable in length; palea narrow or broad, ciliate. Peduncled spikelets smaller but like the sessile, or imperfect, sometimes reduced to a single gl.

- †† Leaves hastate or cordate at the base, often petioled.
- § Pedicel of upper spikelet not \( \frac{1}{2} \) the length of the lower spikelet.
- 9. I. semisagittatum, Roxb. Fl. Ind. i. 320; annual, slender, prostrate below, leaves oblong- or linear-lanceolate from a broad cordate or sagittate base, spikes 2 villous or glabrescent, joints very short and stout, gl. I of sessile spikelet oblong obtuse flat glabrous transversely undulate or ridged or margins nodulose, II lanceolate acuminate villous or pubescent, IV cleft to the middle or higher, awn dorsal below the cleft. Kunth Enum. Pl. i. 513; Hack Monogr. Androp. 208; Lisboa in Journ. Bomb. Nat. Hist. Soc. vi. (1891) 197. I. conjugatum, Thw. Enum. Pl. Zeyl. 365; Trim. Cat. Ceyl. Pl. 107; Hack. l.c. 205 (non Roxb.). Meoschium semisagittatum, Schult. Mant. ii. 435. Spodiopogon semisagittatus, Voigt Hort. Suburb. Calc. 706. Andropogon semisagittatus, Steud. Syn. Gram. 376.

Bengal, Rosburgh. The Deccan, Concan, and Canara, Stocks, Talbot. Ceylon, Thwastes (C.P. 3263).

Stem 12-24 in., slender, flaccid, leafy, pale, internodes long, nodes glabrous or hairy. Leaves 3-5 in., finely acumuate, flaccid, 3-5-nerved, glabrous or sparsely hairy, margins smooth, costa slender, lower with a filform petiole \(\frac{1}{2}\)-1\] in. long; sheaths long, upper often ventricose and open, margins and ligule ciliate. Spikes 1-2\frac{1}{2}\) in., more or less villous with white or grey hairs, joints trigonous, clavate. Sessile spikelets \(\frac{1}{2}\)-1\] in., gl. I thin, green, dorsally villous, margins narrowly inflexed cliefly below the middle; II lanceolate, acuminate, dorsally rounded; III lanceolate, nerved, paleate; IV glabrous or lobes ciliate, 3-nerved, awn \(\frac{1}{2}\)-2\] in; palea longer than the gl. Pelicelled spikelets very shortly broadly pedicelled; gl. I 7-9-nerved, winged above on one side.—I have not seen Huegel's specimens which alone Hackel describes, and for which no habitat is given. The leaf-margins of the specimens I have seen are scarcely "scaberrima." Hackel has two vars.: a. genuinum, spikelets glabrous, joints dorsally smooth; \(\beta\). dasyanthum, gl. I at least of upper spikelet appressedly villous, joints scabrid with hairy margins and dorsal keel.

Var. glabrescens; spikes more slender, joints shortly villous, gl. I shining glabrous transversely undulate below the middle, IV bicuspidate, awn sometimes inserted half-way between the base and sinus, or bipartite and awn geniculately inserted at

the cleft.

10. **I. conjugatum**, Roxb. Fl. Ind. i 321; annual, prostrate below, leaves short base hastate or broadly deeply cordate. spikes 2 short villous, joints very short ciliate, gl. I of sessile spikelet oblong obtuse flat 2-toothed villous even or lower margins obscurely nodose, II lanceolate acuminate puberulous, IV cleft to about the middle, awn dorsally inserted at or below the cleft. Kunth Enum. Pl. i. 513; Hack. Monogr. Androp. 205. Spodiopogon conjugatus, Voigt Hort. Suburb. Calc. 706. Andropogon cordatifolius, Steud. Syn. Gram. 376.

Bangal; near Calcutta, Roxburgh. The Concan, Stocks. Ceylon (naturalized) Trimen.

Stem spreading from the root and creeping, then geniculately ascending, 12-18 in. high, slender, stiff, purplish, repeatedly branching upwards. Leaves 1-1½ in, acuminate, broadest at the base, rather rigid, struate, lower petioled; sheath of the upper ventricose and often open; ligule short, glabrous. Spikes 1-1½ in, sessile; joints quadrately clavate, plano-convex. Spikelets ½ in., pale; gl. I more or less villous from below or above the middle to nearly the top, margins narrowly inflexed not winged, upper half often greener; II strongly keeled, puberulous; III paleate; IV awn slender about twice as long as the spikelet. Pedicelled spikelets subsessile, almost awnless; gl. I as in the sessile.—I have seen only Concan specimens, they agree with Roxburgh's character and figure, except in the nodes being hardly villous.

- §§ Pedicel of upper spikelets  $= \frac{1}{3}$  the length of the lower spikelet, or longer.
- 11. **I. commutatum,** Hack Monogr. Androp. 209; slender, prostrate below, leaves short cordate lower petioled, spikes 2, gl. I of sessile spikelet oblong obtuse or acute 2-toothed flat dorsally undulate tip faintly winged margins obscurely nodulose, II acuminate keeled, IV cleft to the midle, awn inserted by a broad base between the ciliate lobes. Trim. Cat. Ceyl. Pl. 107. I. semisagittatum, Thw. Enum. Pl. Zeyl. 365 (non Roxb.).

NILGHIRI HILLS; Concor, alt. 7000 ft., Clarke. CEYLON; Ambagamowa district,

Thwaites (C.P. n. 2625).

Stem 6-12 in., branching upwards from a decumbent base, nodes glabrous. Leaves 1-3 in., linear-lanceolate, acute, softly harry, margins scabrid; sheath smooth or hairy and keeled above; ligule rounded. Spikes 1-1½ in.; joints = about ½ the sessile spikelet, shortly ciliate. Sessile spikelets ½ ¼ in., green or dark-colrd.; callus

hearded; gl. I coriaceous, keels glabrous narrowly winged above; II ovate-lanceolate, keel obtuse smooth; III lanceolate, 3-nerved, paleate, IV shorter, oblong, glabrous, awn ½-½ in., palea minute. Pedicelled spikelets smaller, awnless, gl. I 5-7-nerved, winged on one side.

12. **I. impressum**, Hack. Monogr. Androp. 210; slender, prostrate below, leaves ovate- or oblong-lanceolate cordate lower narrower petioled, spikes 2 villous, gl. I of sessile spikelets linear-oblong flat dorsally broadly irregularly depressed with shallow subsemilunar pits in the lower  $\frac{2}{5}$  above it winged and 2-cuspidate, II dorsally rounded with a median gibbosity and an auricle-like wing above it, IV cleft to above the middle, awn short geniculately inserted at the cleft.

INDIA, Huegel. The CONCAN? Herb. Dulzell.

Stem 4-8 in, quite glabrous, branching upwards. Leares 2-3 in., upper \(\frac{2}{3}\) in. throad, sparsely harry beneath, margins thickened, scaberulous, sometimes crenulate; sheath compressed, glabrous, ligule oblong. Spikes yellow; joints and pedicels stout, clavate, cil ite with rigid hans, forked at the top. Sessile spikelets \(\frac{1}{4}\)-\frac{1}{3}\ in, shining; callus short, broad, bearded; gl. I narrowed and margins subnodulose at the base, wings crose; II obtuse, chartaceous, ciliate; III oblong-lanceolate, hyaline, 3-nerved, ciliate; IV much shorter, glabrous; awn 1-1\(\frac{1}{4}\) in, with very stout column and golden tip; palea oblong, obtuse, glabrous. Pedicelled spikelets smaller than the sessile; gl. I obtuse, glabrous, many-nerved, winged on one margin; II 7-nerved; IV mucronate.—I have seen only a fragmentary specimen in Dalzell's Herbanium. The sculpturing of gl. I probably varies.

13 I. Feildingianum, Rendle in Journ. Bot. xxii. (1894) 101; stem robust branched above, leaves lanceolate cordate, spikes 2 appressed silkily hairy of gl. I, sessile spikelets broadly oblanceolate flat coriaceous and glabrous below the middle hairy above with 6-8 nerves anastomosing at their tips, keels scaberulous, II 6-nerved keeled aristulate, IV deeply 2-fid, awn inserted between the broad obtuse lobes.

MALAY PENINSULA; Mt. Ophir, Feilding.

- Upper leaves 4-5 by 1-3 in, narrowed from the base to the acuminate tip, rigid, pubescent beneath, 16-26 nerved; sheath pubescent; ligule short, truncate. Spikes 3-3; in, crect, fragile. peduncle villous towards the tip; joints and prdicels stout, trigonous, about \(\frac{1}{2}\)-3 shorter than the spikelet, angles and excised hollow tips long-ciliate. Sessile spikelets \(\frac{1}{2}\) in., narrowed to the base; callus cuneiform, densely bearded; gl. I obtuse or 2-toothed, keels very narrowly winged towards the tip; II rather longer than I, scabrid above and narrowed into the short recurved awn; III oate-oblong, obtuse, hvaline, faintly 3-nerved; palea as long, lanceolate, subchartaceous, with broad rounded hyaline wings; IV hyaline, subscaberulous, awn about \(\frac{1}{2}\) in.: palea as long as the gl., lanceolate, 2-nerved. Pedicelled spikelets smaller, keels of gl. I winged on one side; IV not awned.
- \*\* Margins of gl. I of sessile spikelet broadly incurved below the middle.
  - † Keel of gl. II winged above the middle (see also I. murinum).
- 14. **I. muticum**, Linn. Sp. Pl. 1049; glabrous, creeping, branches erect leafy, leaves ovate to lanceolate rigid, spikes 2 short stout glabrous, gl. I of sessile spikelet oblong 2-toothed smooth keels narrowly winged above, II acuminate keel winged above the middle, IV oblong shortly 2-fid shortly awned between the acute ciliate lobes. Gærtn. f. Fruct. Suppl. 1, t. 181; Kunth Enum. Pl. i. 512, Hack. Monogr. Androp. 212; Wall. Cat. n. 8865; Wight Cat. n. 1716, Herb. n. 3078; Thw. Enum. Pl.

Zeyl. 364; Trim. Cat. Ceyl. Pl. 107; Benth. Fl. Austral. vii. 520. I. glabratum, Presl Rel. Hænk. i. 328. I. repens, Roxb Fl. Ind. 1. 323; Wight Cat. n. 1715. Andropogon muticus, polymorphus, relictus & repens, Steud. Syn. Gram. 374, 375, 377, 374.

The DECCAN PENINSULA, from Canara southwd. BURMA, the MALAYAN PENINSULA and LACCADINE ISLDS CETLON, common.—DISTRIB. China, Malaya, Australia.

Rootstock very stout, creeping for several feet in sand; branches 2-10 in., stout, usually leafy up to the spike; nodes glabrous. Leaves 1-6 in., rarely more, sessile or subsessile, flat, stiff, base rounded or cordate, brown when dry; sheath smooth; ligule obscure. Spikes 1-1½ in., joints and pedicels stout, 3-gonous, = about half the sessile spikelet, truncate. shortly ciliate Sessile spikelets  $\frac{1}{6}$ - $\frac{1}{6}$  in., glabrous, callus very large, smooth; gl. I acute, thickly coriaceous, shining, obscurely many-nerved, dorsally ciliate above the middle, margins below broadly incurred; II larger, rigid, glabrous, 5-nerved; III oblong, obtuse, glabrous, palea with a narrow hyaline wing; IV = II, chartaceous, convolute, 5-nerved; palea oblong-lanceolate, keels ciliate. Pedicelled spikelets laterally compressed, gl. I with the margin on one side inflexed and broadly winged, concave, hairy; gl. IV usually bisexual.

15. **I. Lisboæ**, *Hook. f.*; stem creeping below, leaves oblong acute and open sheaths villously tomentose, spikes 2 sortly tomentose, gl. I of sessile spikelets oblong 2-fid convex keels with broad auricular ciliate wings, II coriaceous scabridly awned keel winged above the middle, IV oblong, obtusely 2-lobed, awn slender inserted between the rounded lobes.

NORTH CANARA, Lisboa.

Stem very stout, rooting at the thickened nodes; branches ascending 8-14 in., glabrous. Leaves on the creeping stem 1-2 in., closely imbricating in two series, the blades reflexed at right angles to the erect short open sheaths, softly tomentose on both surfaces; lower sheaths \( \frac{1}{2} \) in., villous; ligule short, bearded with very long hairs. Spikes 2 in., joints and pedicels about halt as long as the spikelets, stout, concavo-convex, shortly villous, truncate. Sessile spikelets \( \frac{1}{2} \) in., callus very large, glabrous; gl. I thickly cornaceous, dorsally convex, ciliate above the middle, margins broadly incurved below the middle; II rather longer, rigid, dorsally rounded below the wing; III ovate-oblong, obtuse, margins ciliate, paleate, male; palea chartaceous, obovate, 2-nerved, nerves meeting at the tip with very broad hyaline wings above the middle; IV = \( \frac{2}{3} \) II, 3-nerved below the middle, awn about twice as long as the spikelet; palea lanceolute, nerves ciliate. Peducelled spikelets laterally compressed; gl. I convex, broadly winged, villous; IV shortly awned or awnless.—The habit of the only good specimen I have seen is very peculiar.

16. I. ciliare, Retz. Obs. vi. 36; erect or decumbent below, leaves linear, spikes 2-3 villous, gl. I oblong or obovate-oblong convex 5-7-nerved 2-lobed or 2-fid from the keels ending in 2 terminal wings, II acuminate or awned dorsally rounded keeled and winged above the middle, IV obovate-oblong cleft to the middle awned in the cleft. Kunth Enum Pl. i. 513 (excl. syn.); Hack. Monogr. Androp 225, Trim. Cat. Ceyl. Pl. 107; Wight Cat. n. 2322. Duthie Fodd Grass. N. Ind. 30; Benth. Fl. Austral. vii. 520 (var.? podostachyum). I. aristatum, Willd. Sp. Pl. iv. 939; Roxb. Fl. Ind. i. 319. I. barbatum, Herb. Ham. ex Wall. Cat. n. 8860 A. I. geniculatum, Roxb. Fl. Ind. i. 322. I. scrobiculatum, Wight & Arn. ex Steud. l. c. 373. I. tenue, Herb. Ham. ex Wall. Cat. n. 8866. Spodiopogon ciliaris, Nees ex Steud. Nom. Ed. II n. 625; Wight Cat. n. 1693. S. obliquivalvis, Nees in Nov. Act. Nat. Cur. xix. Suppl. i. (1843) 185, Thw.

Enum. Pl. Zeyl. 365; Wight Cat. n. 1693; Wall. Cat. n. 8588; Duthie Grass. N.W. Ind. 16; Benth. Fl. Hongl. 426. S. scrobiculatus, Nees in Wight Cat. n. 1694, & zeylanicus, Nees en Steud. l.c. 373, 377. S. villosus, Nees in Hook. & Arn. Bot. Beech. Voy. 242. Andropogon bifidus, incertus, Macræi, simillimus, patenti-villosus, & Retzii, Steud. 1. c. 373-377. A. Macræi, Steud. I. c 377. A. malacophyllus, Hochst. ex Steud. I. c. 372.—Spodiopogon, Wall. Cat. n. 8859, 8860, 8862.

BENGAL and the LOWER HIMALAYA, from Nepal to Assam, SILHET and BURMA, and southwd. to TRAVANCORE, the LACCADINE ISLDS, Alcock, and GT. COCOS

ISLD., Prain. CEYLON — DISTRIB China, Malaya, Australia.
Stem 6 in. 2 ft., stout or slender, tufted, leafy, sometimes creeping; nodes glabrous or bearded. Leaves 2-6 in., glabrous pubescent or villous; sheath glabrous or hirsute; ligule short, ciliate. Spikes 11-2 in., rather stout; joints and pedicels = about & the spikelets, straight or incurved, ciliate, truncate. Spik-lets 1-1 in.; gl. I polished glabrous or vilious, sometimes pitted, upper part scrobiculate or not, terminal wings erose or ciliolate, scaberulous, margins broadly inflexed below; II glabrous, or dorsally ciliate, anistulate; III oblong, 1-3-nerved, callate, paleate, male; palea with a chartaceous lanceolate centre, and broad hyaline wings; IV glabrous or ciliolate, awn very slender, about twice as long as the spikelet. Pedicelled spikelets rather smaller than the sessile, gl. I acute.—A very common and variable plant, of which Hackel has 3 varieties and 4 Indian subvarieties as follows :-

Var. a. genuinum, Hack.; joints and pedicels diverging at the base, spikelets continuous with the callus, gl. IV of pedicel'ed spikelets usually awned .-1, prorepens, stem creeping, branches erect, gl. I not scrobiculate; 2, scrobiculatum, habit of a, spikelets smaller, gl. I scrobiculate. - 3, malacophyllum, tall, gl. I broadly winged at the tip, keel of II ciliate .- 4, villosum; leaves and sheaths villous.

Var. β. Wallichei, Hack ; tall, joints and pedicels not divergent at the base, sessile spikelet suddenly constricted at the long bearded callus, gl. IV of pedicelled spikelet imperfectly awned.

Var. y. longipilum, Hack.; joint and pedicels as in S. Spikelets glabrous with

a long bearded callus, pedicelled spikelet long-awned.

17. I. heterotrichum, Hack. Monogr. Androp 220; stem prostrate then ascending, leaves linear-lanceolate from a rounded base, spikes 2 stout erect, gl. I of sessile spikelet rhombic-lanceclate upper part triangular acute dorsally smooth glabrous 4-nerved tip membranous 2-toothed keels broadly winged, II subcoriaceous keel winged above, III ovate 3-nerved, IV shorter broadly oblong shortly 2-toothed awned in the notch. PAndropogon comorensis, Steud. Syn. Gram. 431.

NICOBAR ISLDS, Jelmek .- DISTRIB. Madagascar, Seychelles.

Stem about 20 in. high, slender, compressed, quite glabrous. Leaves 2-6 by 1-1; in., glabrous or base fimbriate, margins undulate, scabrid, base contracted at the junction with the compressed loose keeled sheath; ligule very short, truncate, ciliate. Spiles 2-24 in , erect, compressed, joints and pedicels half as long as the spikelet, bearded. Sessile spikelet \(\frac{1}{3}\) in.; callus bearded at the base; gl. I tip membranous 2-toothed, 4-nerved above, margins involute below the middle; II mucronulate, margins ciliolate; III shorter, chartaceous, ovate, acuminate, 3-nerved ciliate, paleate; IV short, ciliolate, awn more or less imperfect confluent with the gl. Pedicelled spikelets \(\frac{1}{3}\) in., gl. I winged from below the middle upwards, 7-nerved glabrous.—Descript, from Hackel. In a Seychelle Isld. specimen which I have examined the keel of gl. II is not dorsally winged, and gl. IV is hyaline 5-nerved with lanceolate acuminate ciliate lobes.

- tt Keel of gl. II. not winged (or winged in I. murinum).
- 18. **I. murinum**, Forst. Fl. Ins. Austr. Prodr. 73; slender, erect or prostrate below, much branched, leaves narrowly linear, spikes 2-3 slender villous, gl. I of sessile spikelets oblong acuminate 2-cuspidate or 2-mucronate faintly 5-7-nerved, keels rounded not winged, II long-beaked awned, IV cleft to the middle, awn long stout inserted between the large ecilate lobes. Kunth Enum. Pl. i. 571, Suppl. 419; Hack. Monogr. Androp. 223. Andropogon murinus, Steud. Syn. Gram. 377.—Spodiopogon, sp. 9, Herb. Ind. Or. Hook. f. & T.

MYSORE or the CARNATIC, G. Thomson.—DISTRB. Tanna Isld. (New Caledonia). Stems 1-2 ft., very slender, erect or prostrate and geniculate at the base, branching upwards; nodes bearded. Leaves 2-4 by \frac{1}{6}-\frac{1}{4} in., sessile, flaccid, setaceously acuminate, narrowed to the rounded base, midrib vanishing upwards; sheath scaberulous; ligule ohlong, membranous. Spikes 1-13 in., often sheathed by the upper leaves, diving red-brown; joints and pedicels = \frac{1}{3} spikelet, rather slender, trigonous, long-ciliate, tops 3-toothed concave Sessile spikelets \frac{1}{6} in., red-brown, callus long, stout, unilaterally stiffly bearded; gl. I dorsally polished, sparsely ciliate with long stiff hairs above the middle, margins ventricosely incurved below the middle; II longer than I, inserted below it on the callus, dorsally convex, faintly 3-nerved, beak 2-toothed with a long or short very slender awn, keel above shortly winged or not; III male, oblong-lanceolate, acute, 1-nerved, margins incurved; palea as long 2-nerved, nerves convergent in the tip scaberulous with broad hyaline wings. IV = II, female, glabrous, awn dilating at its insertion into a semilunar ridge; palea as long as the gl., ovate, lanceolate, 2-nerved at the base. Styles very long, stigmas short. Pedicelled spikelets nearly as the sessile.—This species is contained in an extensive Herbarium formed by G. Thomson, Esq. (brother of the late Superintendent of the Calcutta Botanical Gardens). The flowers in each spikelet are strictly unisexual.

19. **I. hirtum,** Hack. Monogr. Androp. 228; stout, subcrect, leaves long, spikes few or many, gl. I of sessile spikelet lanceolate acuminate or 2-cuspidate 6-9-nerved villous above or glabrate, II aristulate dorsally rounded, IV oblong acutely 2-lobed ciliate awned in the cleft. I. rivale, Hack. l.c. Spodiopogon rivalis, Thw. mss.

BENGAL, BEHAR and the KHASIA HILLS, alt. 4-6000 ft. CHOTA NAGPORE and CENTRAL INDIA. NILGHIEI HILLS, alt. 5000 ft. CEYLON; Mateke East, Beckett.

Stem 2-3 ft., nodes glabrous or sparsely bearded. Leaves 4-8 by \(\frac{1}{2}\)-1 in., finely acuminate, hase narrowed or rounded, glabrous or sheath sparsely hairy; ligule short, ciliate. Spikes 2-20, 1-4 in., joints and pedicels subequal, rather slender, trigonous, ciliate. Spikelets \(\frac{1}{2}\)-\frac{1}{2} in.; callus long-bearded; gl. I more or less herbaceous, 6-9-nerved above the middle, margins broadly incurved below; II inserted below I on the callus, sometimes 2-dentate, 3-5-nerved, villous or glabrate; III oblong-lanceolate, acuminate, faintly 3-nerved, ciliate, paleate, male or neuter; palea oblong, centre chartaceous with hyaline ciliate wings; IV ciliolate; awn very slender, \(\frac{1}{2}\)-\(\frac{1}{2}\) in., confluent with the gl., base semilunar; palea as long as the gl. Pedicelled spikelets gl. I awned, narrowly winged or not.—The Nilghiri plant is a very tall stout form, with long leaves, and a corymbiform fascicle of more than 20 spikes, its gl IV is more deeply cleft, and the awn is not produced downwards in the body of the gl.

Hackel, who was not aware how widely spread and variable a species it is, keeps I. hartum and rwale as distinct species, thus distinguished:—I. hirtum, leaves hirsute on both surfaces, spikes 2-3, gl I of sessile spikelet entirely chartaceo-herbaceous with 7-9 percurrent nerves, densely hirsute in the upper half.—Khasia Hills. I.

rivale, leaves quite glabrous, spikes about 4, gl. I. chartaceous 6-7-nerved in the upper glabrous with the margins sparsely hairy.—Ceylon.

20. **I. timorense**, Kunth Revis. Gram. i. 369, t. 98, Enum. Pl. i. 512, Suppl. 419; slender, decumbent below, leaves sessile and petioled, spikes 2-3 spaningly villous, gl. I ovate or ovate-lanceolate acuminate bicuspidate 5-9-nerved base ventricose, II longer acuminate or aristulate dorsally rounded, IV short 2-lobed awn in the cleft very slender. Hack. Monogr. Androp. 229; Lisboa in Journ. Bomb. Nat. Hist Soc. vi. (1891) 198. I. tenellum, Roxb. Fl Ind. i. 323. Spodiopogon Blumii, Nees ex Steud Syn. Gram. 373. Andropogon Asthenos, Steud. l. c. A. timorensis, Steud. l. c. 376.—Ischiemum n. 4, Griff. Notul. 91, Ic. Pl. Asiat. t. 148, f. 1.—Spodiopogon, Wall. Cat. n. 8863.

BENGAL, Ruzburgh, Silhet, Clarke. Chittagong, J. D. H. S. T. T. Burma, Wallich. Canara and the Central Provinces, Duthre, &c. Malayan Peninsula. Ceylon, Thraites (C.P. 963, 3168)—Distrib Malay and Pacific Islds.

Stem 6-18 in branched and stragging nodes glabrous or spaningly bearded. Leares 1-4 in., linear-lanceolate, acummate, glabrous or sparsely hairy, base of upper rounded, of lower narrowed; sheath lax, mouth hairy; ligule obscure. Spiles 1-2 in, rather slender; joints and pedicels about half as long as the spikelet, nearly equal, shortly cliebte. Sessile spikelets \( \frac{1}{10} \) \( -\frac{1}{2} \) in., greenish, or with green nerves; callus narrow, long-bearded; gl. I margus broadly involute below, subanneled, dorsally convex, polubed, nerves stiong; II recurved, 3-5 nerved, tip 2-toothed, dorsally usually cilate; III lanceolate, palea linear-oblong; IV glabrous, awn very slender shortly exserted. Pedicelled spikelets like the sessile, awned.—A very variable plant, in the form of the leaves especially. Hackel gives four varieties tounded on inconstant characters of the leaves and length of the awn. I have little doubt that I tenellum, Roxb., is It morense. Hackel doubtfully refers it to ciliare, of which it has none of the marked characters.

Sect. II. Sehima (Forsk. Gen). Spikes solitary. Gl. I of sessile spikelet deeply channelled or depressed along the median line (except I. notatum).

21. **I. laxum**, Br. Prodr. 205; perennial, leaves linear scaberulous base narrowed, gl. I of sessile spikelet linear-oblong glabrous 2-cuspidate with a broad membranous translucent depression bounded by two strong flexuous submarginal nerves, nodose in the upper half, II awned, IV 2-fid awned between the lanceolate ciliate lobes, Hack Monogr. Androp. 243; Trim Cat. Ceyl. Pl. 107: Duthie Fodd. Grass N.W. Ind. 31, t. 58; Lisboa in Journ. Bomb Nat. Hist. Soc. vi. (1891) 199; Benth Fl. Austral. vii. 522. I. inscalptum, Hochst. in Flora (1844) 247; A. Rich. Tent. Fl. Abyss. ii. 472. I macrostachyum, Hochst. er A Rich l. c. I. montanum, Herb. Russ ex Wall. Cat. n SSIS A. I. nervosum, Thu. Enum. Pl. Zeyl. 365. I. Sehima, Spreng. Syst Veg. i 298. Hologamium nervosum, Nees in Edinb. N. Phil Journ. xvin. (1835) 185; Wight Cat. n. 1689 Sehima ischæmoides, Forsk. Fl. Eg Arab. 178. S. Kotschyi, Horhst. l.c. S. macrostachyum, Hochst in Schump. Pl. Abyss. n. 1705. Pollinia striata, Spreng. Pugill ii. 12. Andropogon Brownii, Kunth Revis. Gram. i. 163. A. lineatus, Robertianus, Sehima & tacazensis, Steud 1.c. 369. A. macrostachyus & inscalptus, Anderss. in Schweinf. Beitr. Fl. Æthiop. 310. A. nervosus, Rottl. in Ges Naturf. Fr. N. Schrift. iv. (1863) 218; Steud. l.c. A. striatus, Klein ex Willd. Sp Pl. iv. 903; Br. Prodr. 201; Spreng l.c. 298. A. schangulensis, Rupr. in Kotschy Hist. Æthiop. n. 581; Steud. l. c. 369.—Andropogon, Wall. Cat. n. 8818.

RAJPOOTANA and the CENTEAL PROVINCES, Duthic. The DECCAN, Heyne, &c. BURMA, Wallich, &c. CEYLON, Thwaites.—DISTRIB. eastwd. to Australia, and

westwd. to the Cape Verd Islds.

Stems 2-3 ft., tufted on a short stout creeping rootstock, stout or slender, nodes glabious. Leaves 6-10 in., glaucous, tips filiform, nerves strong; sheath ribbed glabrous or hairy; ligule of silky hairs. Spikes 2-5 in., erect, pale, joints rather coherent; pedicels rather slender, compressed, 2-angled, clinate, about half as long as the sessile spikelet. Sessile spikelets \(\frac{1}{6}-\frac{1}{4}\) in., callus shortly bearded; gl. I narrow, nearly flat, nerves very strong especially upwards, those between the lateral irregular in position and length, often anastomosing, margins narrowly incurved; II elliptic, 2-toothed, keel narrowly winged below the slender awn; III linear-oblong or lanceolate, acute, clinate, palea as long glabrous 2-nerved; IV = \(\frac{1}{2}\) III, oblong, 3-nerved, clinate; awn 1\(\frac{1}{4}-2\) in., column stout; palea = the gl., linear-lanceolate, 2-nerved, ciliate. Pedvecled spikelets; gl. I ovate-lanceolate, 2-cuspidate, green or purplish, keels narrowly margined, nerves 5-7 very strong scaberulous, lateral pans close to the margin; II lanceolate, 3-nerved, acuminate; IV awnless.

22. **I. sulcatum**, Hack. Monogr. Androp. 218; stem simple or branched from the base, leaves linear or lanceolate scaberulous, base rounded or subcordate, gl. I of sessile spikelet narrowly linear-lanceolate glabrous, tip acuminate 3-cuspidate dorsally convex with a narrow deep median channel margins incurved, nerves obscure, II linear-lanceolate 2-cuspidate awned, IV 2-fid awned between the lobes.

The CONCAN, DECCAN and CENTRAL PROVINCES, &c.

Stems 8-18 in., usually much branched with many solitary terminal spikes, slender, glabrous, nodes glabrous, peduncles very slender. Leaves 2-10 in., glaucous, scaberulous above, setaceously acuminate, strongly nerved; sheath slender, smooth; ligule a ciliate membrane. Spikes 2-3 in, strict or curved, green; joints and peducels = ½ the lower spikelet, slender, ciliate, tips obliquely truncate. Sessile spikelets ½ in.; callus short, bearded; gl. I scaberulous, tip setiform, keel narrowly margined or winged towards the tip on one side, or simply scaberulous, nerves 2 on each side the furrow; II chartaceous, keel scabrid and margins ciliate above the middle, awn capillary; III = ½ I, hyaline, acute, paleate, ciliate, palea as long truncate; IV linear-oblong, 3-nerved; awn ½-1½ in., column stout, brown; palea = the gl. 2-nerved. Pedicelled spikelets smaller than the sessile, neuter, awnless; gl. I lanceolate, 2-cuspidate, 7-nerved, not channelled, margins incurved, keels margined or winged; II not awned; III as in the sessile spikelet; IV acute not awned.—Varies greatly in habit from a single ascending stem with one spike to a copiously branched one with many spikes. Hackel describes gl. IV of the sessile spikelet as narrowed into the awn, not 2-fid as I find it.

23. I. ramosissimum, Hack. Monogr. Androp. 249; stem erect excessively paniculately branched, spikes short in leafy panicles glabrescent, gl. I of sessile spikelet linear-oblong very obtuse emarginate 8-10-nerved deeply channelled between the median nerves margins involute not keeled aculeolately culiate above, II obtuse mucronulate 5-nerved keel scabrid above with a pencil of hairs, III linear obtuse 3-nerved ciliate paleate, IV = II narrowly linear 1-nerved glabrous narrowed into a stout awn.

E. Indies? Huegel.

Stem 3-4 ft. Leaves linear-lanceolate, glaucous, glabrous, margins scabrid; ligule chartaceous, truncate. Spikes 1-1½ in., straw-colrd., joints linear, compressed, shortly rigidly ciliate, tips excised. Sessile spikelets ½ in. Pedicelled spikelets ½-½ in., linear-lanceolate; gl. I flat acuminate many-nerved; II linear, obtuse, 5-nerved; IV awnless.—The two lowest pair of spikelets are imperfect and awnless. I know nothing of this plant.

24. **I.** spathificrum, Hook. f.; tall, stout, much branched alove, spikes enclosed in long narrow spathes very slender, joints and pedicels long, sessile spikelets \{ \forall in narrowly linear-lanceolate, gl. I of sessile spikelet dorsally deeply channelled densely silkily villous to above the middle, keels rounded scabrid above, II truncate and mucronulate, IV linear-oblong, awn slender inserted between 2 subulate teeth. Trachypogon fasciculatus, Munromss.

BOMBAY; hills of Salsette Isld. in stony places, Jacquemont (n 797).

- Stem 3-4 ft., as thick as a goose-quill below, leaty above, branches erect, nodes glabrous. Leaves 12-18 by & in., finely acuminate, parrowed from the middle to the base, almost petioled, thin, sparsely harry above and beneath, margins smooth, midrib stout pale, nerves obscure; sheath of lower 6 in. and upwards, terete, quite glabrous, of upper passing into compressed lanceolate fig. spathes 3-4 in. long, which alternate in very slender axillary branchlets, the lower with leafy tips; ligule short, scarious. Spikes about 2 in. long, more or less exserted from the spathes, very slender, pale straw-colrd.; joints and pedicels more than half as long as the sessile spikelet, compressed, one angle ciliate. GL. I of sessile spikelet white with silky hairs, thinly corraceous, nerveless, dorsal channel slender transparent forming a ridge ventrally, margins equally involute from base to 2-fid or truncate 2-cuspidate tip; callus very short, bearded; II chartaceous, dorsally convex, nerveless but with a nerve-like fold towards the ciliate margin, keel with long cilia above the middle, scabrid towards the emarginate tip; III shorter, hyaline, oblong-lanceolate, obtuse, 3-nerved, margin above with reflexed hairs; palea lanceolate, 2-nerved, anthers imperfect; IV as long as III, linear, 3-nerved; awn 11 in., yellow, rather testaceous, palea 0. Pedwelled spikelets longer, in.; gl. I dorsally convex (not sulcate), shortly silky, narrowed into a long bisetose glabrous awn .- A very curious species, of which the materials are in rather a young state; it should form a section by itself of Schima were that genus to be restored.
- 25. **I. notatum**, Hack. Monogr. Androp. 246; stems tall tufted, leaves linear narrowed from the base upwards, rigid substrigose, spikes rather stout fragile, gl. I of sessile spikelets oblong, gl. I ovate-oblong glabrous, tip membranous 2-cuspidate dorsally flat with 2 carinal nerves and 2-3 intermediate short green anastomosing ones, keels margined or winged, II 3-nerved shortly awned, IV shorter oblong 2-fid ciliate awned in the cleft.

WESTERN HIMALAYA, alt. 4-7000 ft., from Chamba, Thomson, to Kumaon,

Strackey & Winterbottom.

Stem erect, naked or pubescent below the spike, nodes glabrous. Leaves 6-10 by \$\frac{1}{2}\$ in., setaceously acuminate, green or hoary; sheath bearded at the tip; ligule of long hairs. Spikes 3-8 in., strict or curved, fragile, puberulous; joints and pedicels subclavate, half as long as the sessile spikelet, villously chate, tips obliquely truncate. Sessile spikelets \$\frac{1}{2}\$ in., callus short bearded; gl I obliquely ovate-oblong, tip membranous, margins very narrowly inflexed, keels one or both narrowly winged; II chartaceous, entire, 3-nerved, keeled and narrowly winged in the upper third; III oblong, obtuse, cliate, 2-nerved, palea 2-nerved echiate; IV 3-nerved, awn \$\frac{1}{2}\$-1 in.; palea linear-lanceolate. Pedicelled spikelet, gl. I lanceolate, acuminate, 2-cuspidate, 7-9-nerved; II lanceolate, acute, glabrous; III as in the sessile; IV awnless.

Sect. III. Spikes few or many, subracemose. Gl. I of sessile spikelet deeply or obscurely channelled along the mesian line.

26. I. petiolare, Hack. Monogr. Androp. 238; tall, stout, leaves long narrowed at the base or petioled, spikes many subpaniculately fascicled, gl. I linear-oblong keels narrowly winged towards the 2-toothed truncate tip dorsally deeply channelled, II cymbiform acuminate or mucronate, IV

cleft to below the middle, awn very short inserted in the cleft. ? Lisboa in Journ. Bomb. Nat. Hist. Soc. vi. (1891) 198. Spodiopogon petiolaris, Trin. in Mem. Acad. Petersb. Ser. vi. ii. (1833) 301. S. Lehmanni, Griseb. in Goetting Nachr. (1868) 91. Pollinia Lehmanni, Wight & Arn. ex Nees Pt. Meyer, 186; Duthie Grass. N.W. Ind. 16. Andropogon petiolaris, Steud. Syn. Gram. 398. ? A. petiolatus, Dalz. & Gibs. Bomb. Ft. 303.—Wall. Cat. 8807 A.

Subtropical Himalaya, alt. 5-8000 ft., from Garwhal to Nepal Khasia Hills, alt. 4-5000 ft. ? The Concan, Dalzell, Lisboa. Burma; Karen Hills, Kurz.

Stem 2-3 ft., simple or branched, pubescent below the spikes; nodes pubescent. Leaves 8-12 by  $\frac{3}{4}-1\frac{1}{4}$  in , setaceously acuminate, more or less hairy, margins scabrid; sheath glabrous or margins ciliate; ligule stiff, oblong, truncate. Spikes 8-20,  $\frac{1}{4}-1\frac{1}{4}$  in, simple or divided, rachis glabrous, axils bearded; joints and pedicels flattened, subtrigonous, about as long as the spikelets, shortly ciliate. Spikelets  $\frac{1}{4}-\frac{1}{4}$  in., oblong-lanceolate, pale greenish; callus minute, shortly bearded; gl. I chartaceous, 6-8-nerved to the tip, margins rather broadly inflexed from base to tip; keels scabridly ciliate; II chartaceous, keel scabrid, 3-nerved; III = I, oblong, obtuse, hvaline, ciliate, 3-nerved, paleate, male, palea oblong-lanceolate 2-nerved ciliate; IV =  $\frac{1}{2}$  III, glabrous, 3-nerved, lobes acute, awn  $\frac{1}{4}-\frac{1}{2}$  in.; palea = the gl., lanceolate, 2-nerved, glabrous. Pedicelled spikelet like the sessile, but gl. I hardly channelled; III epaleate; IV male.—As Hackel remarks, this has the habit of a Pollima sect. Leptatherum (where I should have been disposed to place it) with the spikelets more of an Ischæmum. I have seen no Concan specimen.

27. **I. robustum**, *Hook. f.*; tall, stout, leaves long narrow coriaceous softly tomentose on both surfaces, spikes few racemed strict erect, joints very stout obliquely truncate lower minutely puberulous, sessile spikelets \$\frac{1}{4}\$ in ovate- or oblong-lanceolate acute coriaceous awnless dorsally flat quite glabrous with 6-9 broad low nerves, keels scabrid above the middle, II coriaceous 7-9-nerved, III 3-nerved paleate male, IV oblong apiculate awnless.

N.W. HIMALAYA; "Pauni, in Bursahir, alt. 7000 ft.," Brandis (Herb. Calcutt.). Stem several feet high from a hard rootstock, hard, solid, nearly as thick as a goose-quill, naked below. Leaves 12-18 by \(\frac{1}{2}\)-\frac{1}{2}\) in , narrowed from the base to the long acuminate tip, sides incurved scaberulous, midrib very stout; sheath long, finely pubescent; ligule a brush of long hairs. Spikes 4-5 in., lower stipitate; pedunole stout, glabrous; joints \(\frac{1}{2}\) shorter than the spikelets, dorsally rounded, ventrally deeply concave. Sessile spikelets quite glabrous, appressed to the rachis, upper in the spike smaller than the lower; callus very short, stout; gl. I sometimes channelled in the middle, very variable in the number and position of the rib-like nerves, tip minutely toothed, margins narrowly incurved; II as long as I, eciliate; III shorter, male; palea, ovate-lanceolate, 2-nerved, eciliate; IV as long as III, rigidly membranous, 3-nerved; palea nearly as long, 2-nerved, both eciliate. Pedicelled spikelet \(\frac{1}{2}\) smaller than the sessile; gl. I oblong-lanceolate, acuminate, other gls. and palea as in the sessile, but both fig.—Very unlike any other N. Induan species.

#### DOUBTFUL SPECIES.

I. COROLLATUM, Nees ex Steud. Syn. Gram. 369; Duthie Grass. N.W. Ind. 18; Hack. Monogr. Androp. 252. Andropogon corollatus, Steud. I.c.—Mussoorie, Royle,

I. Hugelii, Hack. Monogr. Androp. 252; annual, glabrous, decumbent and branched below, leaves 1-12 by 1 in. flat flaccid, upper sessile cordate-lanceolate, lower shortly petioled, spike solitary 1½-2 in. rather stout, joints clavate dorsally convex, gl. I of sessile spikelets oblong obtuse coriaceous below with often interrupted ridges about the middle glabrous or dorsally ciliate, margins narrowly inflexed scabrid, II ovate deeply keeled, III oblong hyaline glabrous paleate, IV linear-

lanceolate acute 1-nerved awnless glabrous, palea as long as the gl. Pedicelled spikelet awnless, pedicel very short; gl. I linear-lanceolate, flat, acuminate manynerved .- The Panjab, at Busahir, Huegel .- Hackel describes this as very like I. semisagittatum, and makes of it a subgenus of Ischamum, characterized by the solitary spike, stout joints, and awnless spikelets, closely connecting Isohamum with Rottboellieg.

I. LONGISPICATUM, Munro ex Duthie Grass. N.W. Ind. 18, name only.

## 38. EREMOCHLOA, Buse.

Perennial grasses. Leaves more or less equitant, rigid. Spikelets 1-fld., flat, secund, solitary, sessile at each internode of a terminal narrow compressed spike, with a rudimentary pedicelled. Glumes 4, I nearly flat, oblong, smooth, coriaceous, not awned, margins pectinate; II ovate-lanceolate, acuminate, chartaceous, 3-nerved; III hyaline, oblong, obtuse, paleate, male; IV smaller, hyaline, oblong, obtuse, 1-nerved, fem. or bisexual; palea oblong-lanceolate. Lodicules obliquely truncate. Stamens 3, anthers long. Stigmas short, feathery.—Species 8, E. Asia and Australia.

1. E. muricata, Hack. Monogr. Androp. 262; gl. I broadly ovateoblong with 2 fan-shaped terminal wings. Ægilops ciliaris, Koen in Neue Schrift. Ges. Nat. Berl. iv. (1810) 210; Roem. & Sch. Syst. ii. 772; Griff. Notul. iii. 110, Ic. Pl. Asiat. t. 158 (excl. 4 upper left-hand figs.). Æ. muricata, Retz. Obs. ii. 27. Ischæmum pectinatum, Trin. in Mem Acad. Petersb. Ser. vi. ii. (1833) 296; Wall. Cat. n. 8847; Thwaites Enum. Pl. Zeyl. 436; Trim. Cat. Ceyl. Pl. 107. I. ciliare, Nees in Herb. Wight. n. 1717 (not of Wight Cat). Andropogon pectinatus, Steud. Syn. Gram. 369. Rottboellia muricata, Retz. l. c. iii. 12.

SOUTH DECCAN PENINSULA, Koenig, &c. CEYLON; Trincomalee, Glenie .-DISTRIB. Australia.

Quite glabrous. Stem 6-18 in., compressed. Leaves 3-6 by 1-1 in., tips rounded apiculate. Spike 2-5 in., linear; rachis glabrous, brittle, not excavated. Spikelets in.; gl. I nearly orbicular, dorsally slightly convex, many-nerved, wings crenate; spines very many, upcurved, nearly as long as the gl. is broad. Pedicelled spikelet a single lanceolate acuminate coriaceous nerved gl with thin inflexed margins.

2. E. bimaculata, Hack. Monogr. Androp 265; gl. I elliptic subacute with 2 small low rounded terminal wings, spines shorter than the gl. is broad. Ischæmum pectinatum, Benth Fl. Austral. vii. 521.

UPPER BURMA; near the Serpentine Mines, Griffith.—DISTRIB. Australia.

Habit, &c. of E. muricata, but leaves much narrower, narrowed at the obtuse tip; spikes more slender; spikelets much narrower, with fewer nerves and shorter spines, callus puberulous.

3. E. zeylanica, Hack. Monogr. Androp. 263; gl. I elliptic obscurely winged at the subacute tip, spines longer than the gl is broad. Trim. Uat. Ceyl. Pl. 107. Ischæmum pectinatum, Wight Cat. n. 1717. I. falcatum, Thw. Enum. Pl. Zeyl. 436.

CRYLON, Walker, Thwaites (C.P. 3327). ? DECCAN PENINSULA, Wight. Habit, size of spikelets, &c. as in bimaculata, of which it is probably only a variety, differing chiefly in the long spines of gl. I and glabrous callus.

4. E. leersioides, Hack. Monogr. Androp. 264; gl I narrowly oblong acute, spines subcrect longer than the gl. is broad. Ischæmum leersloides, Munro in Proc. Amer. Acad. iv. (1864-5) 363; Benth. Fl. Hongk. 425.

PEGU, Kurz .- DISTRIB. China, Tonkin.

Very near E. zeylanıca, but gl. I is smaller and narrower with the long spines of E. muricata.

5. **E. Helferi**, Munro ex Hack. Monogr. Androp. 266; gl. I broadly ovate subacute, spines longer than the gl. is broad, upper spikelet a scabrid pedicelled bristle. E. ciliatifolia, Hack. l. c.

TENASSERIM, Griffith, Helfer.

Leaves 4-6 by  $\frac{1}{4}-\frac{1}{3}$  in (broader than in the other species), flat, ciliate, tip rounded. Spike  $1-1\frac{1}{2}$  in. Spikelets  $\frac{1}{3}$  in.; gl. I 5-nerved, nerves an astomosing above.

### 39. POGONATHERUM, Beauv.

Delicate annual or perennial grasses with capillary peduncles. Leaves erect. Spikelets 1-2-fid., binate (usually a sessile bisexual and pedicelled fem.) imbricate on the fragile rachis of a solitary terminal capillary spike, 2-awed; awns capillary, often interlaced. Glumes 4, membranous; I oblong, concave, tip truncate or rounded, long ciliate; II as long as I or rather longer, tip acute or 2-toothed, awn terminal; III (in the upper spikelet 0) hyaline, paleate, male; IV hyaline, narrow, 2-fid, long-awned, palea oblong glabrous. Lodicules 0. Stamens 1 or 2, anthers long. Stigmas slender. Grain oblong, free.

The following three species are probably forms of one, being united by many intermediates; they are however for the most part readily distinguishable in India.

1. P. saccharoideum, Beauv. Agrost. 56, t. 11, f. 7; spikelets  $\frac{1}{10} - \frac{1}{8}$  in., gl. I truncate retuse or tip rounded, II ciliate above the middle, stamens 2 rarely 1. Thw. Enum. Pl. Zeyl. 365; Trim. Cat. Ceyl. Pl. 107; Duthie Grass. N.W. Ind. 16, Fodd. Grass. N. Ind. 27. P. saccharoideum, a. genuinum, Hack. Monogr. Androp. 193. P. polystachyum, Roem. & Sch. Syst. ii. 497; Wight Cat n. 1679, Wall. Cat. n. 8844. Pollinia polystachya, Spreng. Syst. ii. 288; Kunth Revis Gram. 493, t. 162. Perotis polystachya, Willd. Sp. Pl. i. 324. Saccharum paniceum, Lamk. Encycl. 1. 595, Illust. t. 40, f. 31.

Throughout the hilly parts of India, in dry places, from the Panjab eastward to Bhotan, Manipur and Burma, ascending the Himalaya to 4000 ft., and southward to Central India and Ceylon.—Distrib. China, Malaya.

Stem 6-18 in. usually densely tufted, nodes glabrous or bearded. Leaves 1-3 in. Spikes  $\frac{1}{2}$ -1 in. Hairs of callus shorter than the spikelet.

2. P. crinitum, Trin. Fund. Agrost. 166; spikelets \(\frac{1}{14} \cdot \frac{1}{1}\) in., gl. I truncate, II glabrous or nearly so, stamens 1 rarely 2. Kunth Enum. Pl. i. 478, Suppl. 380, Aitchis. Cat Panyab. Pl. 173, Franch. & Sav. Enum. Pl. Jap. ii. 189 (excl. cit. Beauv.). P. saccharoideum, var. \(\theta\). monandrum, Hack. Monogr. Androp. 193. P. polystachyum, Kunth Revis. Grom. 493 (in part) t. 161. P. refractum, Nees in Hook. & Arn. Bot. Beech. Voy. 239; in Pl. Meyen. 182. Pollinia monandra, Spreng. Syst. i. 288. Pogonopsis tenera, Presl Rel. Hænk. i. 133, t. 46. Homoplitis crinita, Trin. Fund. Agrost. 166. Ischæmum crinitum, Trin. in Mem. Acad. Petersb. Ser. vi. ii. (1833) 298. Andropogon crintus, Thunb. Fl. Jap. 40, t. 7. A. monandrus, Roxb. Fl. Ind. i. 260; Steud. l. c. 368.—Pogonatherum, Griff. Notul. iii. 81, Ic. Pl. Asiat. t. 145, f. 2.

Throughout INDIA, extending to the Malay Peninsula, usually at lower elevations and in hotter places than P. saccharoideum.—DISTRIB. Affghan, China, Malaya, N. Hebrides.

- A different looking plant from the common form of *P. saccharoideum*, with paler more flexuous squarrose awns, much smaller spikelets, and the hairs of the callus longer than the callus, but intermediates occur, and I could have followed Hackel in uniting them had he included the following.
- 3. P. rufo-barbatum, Griff. Notul. iii. 81, Ic. Pl. Asiat. t. 145, f. 11; spikelets  $\frac{1}{6}$  in., gl. I broadly 2-lobed. III villous above the middle, IV and its palea chate, stamens 2. Hack. Monogr. Androp. 193. P. majus, Griseb. in Goett. Nachr. (1868) 92.

KHASIA HILLS, by streams, alt. 3-5000 ft., Griffith, &c.

Stem 10-24 in.; nodes glabrous. Leaves 2-4 in, sometimes \( \frac{1}{4} \) in. broad. Spikes 1-2\( \frac{1}{4} \) in.; hairs of callus shorter than the spikelet; gl. I, 2-lobed but hardly 2-auricled (as described by Hackel).—Only, I think, a large form of saccharoideum growing in wet places.

# 40. APOCOPIS, Nees.

Annual or perennial grasses. Leaves short. Spikelets 2-fid. (lower fi. bisexual, upper fem.) solitary or the upper reduced to a pedicel, distichously imbricate on solitary or digitate articulate spikes, dorsally compressed. Glumes 4, I broad, cuneiform, coriaceous, many-nerved, tip rounded ciliate; II thinner, truncate, 2-keeled; III narrow, hyaline, paleate; IV hyaline, entire or 2-fid, awned or reduced to an awn dilated at the base; palea very short, convolute, truncate, tip ciliate, or 0. Lodicules 0. Stamens 2-3. Styles very short, stigmas long. Grain terete, free.—Species 3-4, Eastern Asiatic.

1. A. Boyleanus, Nees in Proc. Linn. Soc. i. (1894), et in Ann. & Mag. Nat. Hist. vii. (1841) 220; perennial, gl. IV oblong 2 fid, awn short or 0. Hack. Monogr. Androp 257; Duthie Grass. N.W Ind. 16. Ischæmum paleaceum, Trin. in Mem. Acad. Petersb. Ser. 6, ii. (1833) 293; Sp. Gram. Ic. t. 333. Andropogon paleaceus & himalayensıs, Steud. Syn. Gram. i. 376, 377. Ischæmum denticulatum, Herb. Ham. ex Wall. Cat. n. 8857.—Wall. Cat. n. 8843.

SUBTROPICAL HIMALAYA; alt. 3-4000 ft., from Kumaon to Bhotan. Khasia Hills, alt. 4000 ft. Munnepore, alt. 4-5000 ft., Watt. - Distrib. Borneo.

Stem erect, 10-24 m., usually simple. Leaves 2-4 in., narrowly lanceolate, acuminate, and sheaths glabrous or softly hairy. Peduncle long, slender; spikes 1-2, rarely 3, erect, 1-1½ in.; rachis rusty-villons, brittle. Spikelets about ½ in., much longer than the joints; gl. I truncate, dark red-brown with a broad yellow tip; IV awn very slender, included or if exserted not twice the length of the spikelet.

2. A. Wightii, Nees ex Steud. Syn. Gram. 377; annual, gl. IV linear entire or 2-dentate, awn long. Wight Cat. n. 2352; Hack. Monogr. Androp. 258; Thwaites Enum. Pl. Zeyl. 365; A. Wrightii, Munro in Proc. Am. Acad. iv. 363, et in Benth. Fl. Hongk. 421. A. Beckettii, Thw. ex Trim. Cat. Zeyl. Pl. 107. Amblyachyrum mangalorense, Hochst. ex Hohenack. Pl. Ind. Or. n. 231 & in Flora, xxxix. (1856) 26.

BERAE, CENTRAL INDIA, throughout the DECCAN PENINSULA, BURMA, and CEYLON.

Stem tall, erect like A. Royleanus, or low and densely tufted. Leaves 1-3 in, glabrous or hairy. Spikes \(\frac{1}{2}-1\frac{1}{2}\) in., slender or stout. Spikelets \(\frac{1}{2}-\frac{1}{2}\) in.; gl. I yellow with red-brown tips, or dark brown with yellowish tips, glabrous or clothed with red-brown shiny hairs, tips retuse ciliate with minute or long hairs; II 3-nerved or nerveless, sides sharply inflected, angles smooth or scabrid; III nearly = I, tip ciliolate; IV very narrowly oblong or almost linear, awn two to six times as long as the spikelet; palea very short and convolute.—Very variable, and doubtfully separable from Royleanus which is stouter with stouter spikes. Wight's original specimen (Cat. n. 2352) is 18-20 in. high, very slender, leafy upwards, with slender pale spikes, and glabrous gl. I; it strongly resembles some specimens of Royleanus, and is I suspect perennial. This and a var. zeylanicus (Wightis, Thw) with more hairy, darker gl. I, forms Hackel's Subsp. genumus. His Subsp. mangalurensis includes short densely tufted states, with shorter red-brown densely hairy and long-ciliate gl. I; it is the common Deccan form, and includes Thwaites' A. Beckettis. The difference between the narrow gl. IV of all states of A. Wightis, and the much broader hyaline one of A. Royleanus, is one of degree only.

Var. raginata; spikes more or less included in the long spathiform sheaths of the uppermost leaves. A. vaginatus, Hack. in Estr. Bot. Zeitschr. xli. (1891) 8.—

Hazaribagh, Clarke.

## 3. A. pallida, Hook. f.; annual, gl. IV reduced to a slender awn.

NILGHIRI HILLS, Foulkes.

Stems slender, stiff, widely creeping and rooting, with short geniculately ascending fig. branches, 2-6 in. high. Leires 1-2 in., linear, acuminate, smooth, sparsely hairy, margins thickened, subscaberulous; sheath open; ligule 0. Spikes  $\frac{1}{4}$ -1 in.  $\frac{1}{4}$  in. diam., very pale; rachis slender, ciliate. Spikelets  $\frac{1}{10}$  in.; gl. I broadly cuneitorm, ciliate with long hairs, 7-9-nerved; II oblong, obtuse, 3-nerved, plateral nerves submarginal, keels ciliate; III oblong or lanceolate, glabrous, nerveless; IV awn  $\frac{1}{4}$ -1 in., brown, not dilated at the base; palea 0. Pedicelled spikelets, gl. I spathulate, truncate, villous, sides recurved; II as in the sessile spikelets.

# 41. ARTHRAXON, Beauv.

Annual or perennial slender grasses. Leaves short, broad, deeply cordate. Spikelets 1-fid., solitary or with a rudimentary pedicelled second, sessile on binate digitate or fascicled jointed spikes. Glumes 4, I largest, usually strongly tubercled, not embracing the inner, II keeled, 3-nerved; III small, hyaline; IV shortest, lanceolate, keeled, hyaline, with usually a long dorsal or basal awn; palea minute or 0. Lodicules subquadrate. Stamens 2-3. Styles short or 0, stigmas long, laterally exserted. Grain narrowly linear.—Species 8, tropics of Old World.

Sect. I. PLEUROPLITIS. Joints of rachis of spike rectangularly truncate.

- \* Stamens 3, anthers large, nearly as long as gl. IV.
- 1. A. lanceolatus, Hochst. in Flora, xxxix. (1856) 188; spikelets linear-lanceolate, gl. I linear dorsally convex smooth margins hyaline inflexed, marginal nerves armed with very strong curved teeth. Hack. Monogr. Androp. 347; Duthie Grass. N.W. Ind. 17. A. echinatus & serrulatus, Hochst. l.c. Batratherum echinatum, Nees in Edinb. Phil. Journ. xviii. (1835) 181; Wall. Cat. n. 8829; Aitchis. Cat. Panjab Pl. 174. B. lanceolatum, Nees l. c.; Wight Cat. n. 1684. B. serrulatum, Hochst. ex A. Rich. Tent Fl. Abyss. ii. 458. Andropogon echinatus, Herb. Heyne ex Wall. Cat. n. 8829; Steud. Non. Ed. II. i. 191; Edgew. in Journ. As. Soc.

Beng. xxi. (1853) 182: Duthie Grass. N.W. Ind. 16. A. lanceolatus, Rach. Fl. Ind. i. 277; Kunth Enum. Pl. i. 498. A. prionodes, Maxim. in Bull. Soc Nat. Mosc. hv. (1879) 68 (non Stewl). A. serrulatus. Link Earm. Hert. Berol. 1. 241; A. Rich I.c. Thelepogon elegans, Roth Nov. Sp 62 (ch ir. fals, ex Roem. & Sch. Syst. ii. 788; Wight Cat. n. 1684.-Batratherum, Wall, Cat. n. 8830.

WESTERN HIMALAYA, alt. 5-8000 ft. from Kashmir to Nepal. Plains of the PANJAB and RAJPOOTANA. BEHAR, on Parusuath, alt. 4000 ft., Clarke. Coro-MANDEL, Rozburth. Sind, Stocks.—Distrib. Abyssmia, Tonkin, China.

A tall much-branched suberect or subscandent grass 1-3 ft. high with rigid stems thicker than a crow-quill. Leaves very variable, from broadly ovate and 1-3 in. by 1-13 m., to parrowly linceolate and 1-4 by 1-2 m., candate-acuminate, flaced or rigid, glabrous or harry, margins serrulate or ciliate with stiff hairs, nerves obscure; ligule rounded. Spikes few or many, 1-2 in., rachis sparsely harry, joints about half as long as the suikelet, margins cilite Spikelets 1-1 in., very narrow; gl. I acute, top hyalme 5-7-nerved, dorsally smooth or muriculate, II lanceolate, 3-nerved; III shorter, linear-oblong, acute; IV hvaline, awn about 1 in. long. Pedic-lie l's, i lets linear-lanceolate, keels hi-pidulous; authers perfect.-Hackel has 5 varieties and subvarieties of this species, but I fail to limit them after studying copious materials.

2. A. rudis, Hochet. in Flora, xxxix (1856) 188; spikes few, spikelets ovoid, gl. I ovate acute convex 7-nerved, nerves above armed with a few irregular spinescent tubercles, margins hyaline narrowly incurved IV paleate. Hack. Monogr. Androp. 348. Andropogon rudis, Steud Syn. Gram. 383; Thwaites Enum. Pl. Zeyl 365; Trim. Cut. Ceyl. Pl. 107. A. castratus, Griff Notul. ii 89. Batratherum rude, Nees ex Steud. l. c .-Arthraxon, Wall. Cat n. 8834, 8837.

UPPER ASSAM; Suddiya, Griffith. SILHET, de Silva. CEYLON; in the Central

Province, Thicartes (C.P. 866)

Sten 1-2 tt, erect from a geniculate branched rooting (blood-red, Graff.) base, rigid, as thick as a crow-quill or less. Leaves 2-4 in., lanceolate, acuminate, glabrous or sparsely hairs, margins strongly ciliate. Peduncle long, slender, naked. Spikes 1, 2, or few, 1-1 in., peduncled; peduncle and rachis rather stout smooth, with sometimes an empty glume Spikelets; in. (red-brown, Griff.), coriaceous; gl. I 9-nerved; II 3-nerved, acute; III hyaline, oblong, chate, 1-nerved; IV lanceolate, ciliate, awn inserted below the middle, about twice as long as gl. II, palea linear-oblong, ciliate.—The only species in which I have seen a palea to gl. IV.

3. A. breviaristatus, Hack. Monogr. Androp. 350; spikes many. spikelets ovate-lanceolate, gl. I oblong-lanceolate subscute convex nerves 7 pair tubercled nearly to the base, II acute keel ciliate margins with deflexed cilia, awn short. Butratherum khasianum, Munro mss. B. echinatum, Herb. Ind. Or. Hf. & T. (in part).

KHASIA HILLS, alt. 5000 ft., Grefith, &c.

Stems 2-4 ft., geniculately branched below, about as thick as a dove's quill. Leaves 1-2; in., ovate or ovate-lanceolate, finely acuminate and sheaths glabrous or bairy. Peduncle long, usually naked, slender. Spikes 10-20; 1-3 in.; rachis and pedicels nearly glabrous. Spikelets 1-1 in., purplish; gl. I variable in the number and size of tubercles on the nerves; IV not much shorter than II, awn subbasal, shortly exserted. Anthers very large (sometimes 2 only?)—Resembles a very large A. ciliarus.

4. A. submuticus, Hochst. in Flora, xxxix. (1856) 188; spikes few short pale, spikelets all sessile very small linear-oblong terete, gl. I 7-nerved, nerves more or less muriculate, II acute keel ciliate, IV with a very short included basal awn or 0. A. ciliaris, Subsp. 6, submuticus, Hack Monogr. Androp 356 Batratheram submuticum, Nees ex Steud. Syn. Gram. 382; Duthie Grass N.W. Ind. 17. Andropogon submuticus. Steud. 1. c.—Arthraxon, Wall. Cat. n. 8835 B (in part) & 8836.

WESTERN HIMALAYA; from Garwhal to Central Nepal, alt. 2-6000 ft, Wallich,

&c. TAVOY, Gomez.—DISTRIB. China, Loochoo Islds.

Annual. Stems 6 in.-3 ft, slender, much-branched and rooting below, as thick as a spariow's quill. Leaves \(\frac{1}{2}-1\) in., broadly ovate-cordate, acuminate, and sheaths glabrous or hairy, margins strongly ciliate. Peduncle filiform, usually long and naked. Spikes 3-5, \(\frac{1}{2}-1\) in. long, very slender; rachis quite glabrous, flexuous. Spikelets \(\frac{1}{3}\) in , pale, all sessile (male?). Stumens as long as gl IV.—A puzzling plant, and possibly the male of an unrecognized form of ciliaris from which species it differs in the 3 stamens as long as gl. IV, as well as in the minute flowers, and usually the want of an awn, though a very short one is sometimes present. One very long specimen (Herb. J. S. Lace) has besides the terminal naked peduncle, very short sheathed lateral ones.

5 A. spathaceus, Hook. f.; slender, panicles (always?) in long spathiform narrow sheaths, spikes few, spikelets oblong-lanceolate, gl. I of sessile spikelet oblong-lanceolate 5-7-nerved, nerves covered throughout their length with a row of acute tubercles, awn of gl. IV dorsal.—Batratherum, Herb. Wight n. 3257.

Deccan Peninsula; Gunde Cottah Hill fort, Cuddapah, Wight Herb. 357. Stems 1-2 ft, not thicker than a sparrow's quill, branched. Leaves 1-2 in., oblong-lanceolate, acuminate, flaccid, ciliate and sheaths sparsely harry; floral sheaths terminal, erect, 1½-2 in. by ½-½ broad, membranous, green, usually overtopping the panicle. Spikes ½-½ in., very pale; pedicels and joints sparsely harry. Upper spikelets male; gl I quite smooth, striate; II hyaline; IV awnless. Stamens more than half as long as gl. IV., linear.—A well-marked species by the spathe and tubercles of gl. I. A specimen from Belgaum (Ritchie, n. 796 in Herb. Munro) closely resembles this in the tubercled gl. I; it has only 2 very small imperfect anthers and no pedicelled spikelets.

6. A. inermis, Hook. f.; spikelets solitary (pedicelled 0) oblong-lanceolate, gl. I dorsally convex obtuse strongly 7-9-nerved unarmed margins (not incurved) and nerves scabrid.

The CONCAN, Woodrow.

Stems very siender, much geniculately branched. Leaves 1-2 in., ovate, broadly amplexical, caudate-acuminate, tips setaceous, glabrous or puberulous above, ciliate with long hairs beneath, margins smooth; sheath hairy. Spikes few, short, green, irregularly sparingly divided; peduncle slender, naked, branches \(\frac{1}{2}\) in., very slinder, ciliolate. Spikelets \(\frac{1}{10}\) in., all sessile, rather distant, gls. thin, I strongly herved; II as long as I, obovate-oblong when spread out, obtuse, emarginate, apiculate, 3-nerved, hardly keeled, nearly smooth; III 0 (or palea of IV) shorter than II, lanceolate; awn basal, twice as long as the spikelet; palea oblong, obtuse, glabrous. Anthers very large.

- \*\* Stamens 2 or 3; anthers not half the length of gl. IV.
- 7. A. ciliaris, Beauv. Agrost. 3, t. xi. f. b; peduncles glabrous below the spikes, spikes many \(\frac{1}{2}\)-3 in. subflexuous, joints = \(\frac{2}{3}\) the spikelets in length or longer glabrous or shortly cliate, gl. I entire at the tip, nerves scabrid or echinate above the middle, II acute or acuminate. Hack. Monogr. Androp. 354; Benth. Fl. Austral. vii. 524 (excl. syn.). VOL. VII.

Hance in Journ. Linn Soc xiii. (173) 134. Andropogon Retzii & incertus, Stend Syn. Grum. 375.—Arthraxon, Wall. Cut. n 88.33. 8835 A. (B. in part) 8836.

Helly districts of INDIA from Kashmir eastwards to Burma, ascending the

Himalaya to 5500 ft., and southward to the Nilghiri Hills and CEYLON.

Stems tall or short, weak, rarely as thick as a crow-quill, tufted and branched from the base, or with long creeping stems and ascending leafy branches. Leaves 1-3 m., ovate to lanceolate, glabious or laxly hairy, margins ciliate; sheath with ciliate margins. Spikes few or many, on long naked or spathaceously sheathed glabious peduncles, pale green or purplish. Spikelets 1-1 in , lanceolate or linearlunceolate, callus naked or shortly bearded; gl. I scaberulous, 7-10-nerved; II obscurely 3-nerved; III much shorter, oblong acute; IV usually awned. Stamens variable in length never = 1 gl. IV.-I give below Hackel's grouping of the two principal forms of this protean plant and their synonymy. For his elaborate subdivision of these into 4 subspecies and 9 varieties I must refer to his work. These are founded on characters of unequal value, and subject to diverse limitations. After a long study of the mass of materials at Kew I recognize the following widely distributed leading Indian forms:-1, A vulaceus; rather robust, spikes 6-20 1-2 in long, spikelets 1 in. more or less purple, awas twice as long as the spikelet or shorter; 2, nudue, usually tell and widely strangling, spikes many 1-2 in very stender raches capillary, sparsely hairy, spikelets \( \frac{1}{10} - \frac{1}{1} \) in narrow very pale, stamens as often 3 as 2; 3, \( \text{plumbeus} \), stems shortly straggling much branched, leaves small, spikes 2-3 rarely more  $\frac{1}{2}$ - $\frac{3}{4}$  in, long, rachis capillary nearly glabrous, spikelets  $\frac{1}{10}$  in. usually purple, approaches nearest to A. mwrophullus; 1, muriculatus; habit of plumbens, but nerves of gl. I echinulate nearly to the base. - N W. India.

Hackel's two leading groups to which I have added a third :-

a. Joints of raches glabrous, or with a few scattered haves towards the tip

A chlaris, Beaur I. c. A. grachs & lasiocoleos, Hochst. in Flora, xxxix. (1856) 1-8, 189. A. japonicus, Miq. Ann. Mus. Bot. Lugd. Bat. ii 288 A. japonicus, Miq. Ann. Mus. Bot. Lugd. Bat. ii 288 A. japonicus, Hochst. in Flora, xxxix. 1856) 159. A. Langsdorfianus, Hochst. l. e.; B. is Fl. Orient. v. 455. A. nudus, Benth ex Clarke in Journ. Linn Noc xxv. (1889) 86. Batratherum nudum, Nees ex Steud Syn. Gram. 383. Pleuropht s centro-asiatica, Griveb. in Leideb. Fl. Ross. iv 477. P. Lang-dorffiana, Trin. Fund. Agrost. 175, t. 16. Lucæa gracilis, Kunth Revis. Gram. ii. 489, t. 159. Enum. i 472. L. Lang-dorffiana, Steud. l. c. 413. Lasiolytrum hirtum, Steud. in Flora (1846) 18; Syn. Gram. 12. Las pilosum, Steud. ex Jord. in Num. Soc. Sc. Nat. Cherb. v. (1857) 299. Pollinia ciliaris, Spreng. Syst. i. 289. Andropogon amplexifolius, Trin. in Mem. Acad. Petersb. Ser. VI. ii. 1833, 274. A. Iusiocoleos & nudus, Steud. l. c. 383. Phalaris hispida, Thunb. Fl. Jap. 44. Deyeuxia japonica, Spreng. l. c. 254

b. Joints of rachis, at least the upper, more or less ciliate.

A. coloratus, major, Schimperi, Schmidtii & violaceus Hochst. l. c. 188. Batratherum plumbeum, Munro ex Duthie in Athinson Gazette, 640. Pleuroplitis ciliata, Schmidt Beitr. Fl. Cap. Verd Iss 152. P. plumbea & violacea, Steud. l. c. 414. P. Quartiniana, Regel in Bull. Acad. Petersb. v. (1866) 757, Wight Cat. n. 1683. P. caucasiei, Rupr. ex Regel in Bull. Acad. Petersb. v. (1865) 757, Wight Cat. n. ciliata, major, plumbea & violacea, Steud. l. c. 414. Andropogon Alectoridia, Steud. l. c. 383. A. violaceus, Heyne ex Steud l. c. 414. Alectoridia Quartiniana, A. Rich. Tent Fl. Abuss. n. 448, t. 99.—Wall. Cat. n. 8833 A.

c. Spikes silvily rillous, spikelets \$ - \frac{1}{2} in., gl I acu e entire or minutely 2-toothed,

awn 1 in. or more.

A. cuspulatus, Hochst. in Flora (1856) 188; Hack. Monogr. Androp. 353. A. micans, Hochst. l. c. Batratherun means, Nees in Ann. & Mag. Nat. Hist. vii. (1835) 220. Pleuroplitis major, Rejel in Bull. Acid. Petersb. v. (1866) 750 (excl. Syn. Lucxa major). Andropogon cuspulatus, Hochst. ex A Rich. Tent. Fl. Abyss. ii. 456. A. lunceolatus, Baler Fl Maurit. 444 (non Roxb). A. micans, Steud. Syn. Gram. 382.—N.W. Himalaya, Nilghiri Hills, Mauritius, Air. trop.

-Batratherum, Wall. Cat. n. 8828.

8. A. microphyllus, Hochst. in Flora, xxxix. (1856) 188; peduncles puberulous beneath the spikes, rachis of spikes strict, joints = ½ the spikelets in length or shorter ciliate with long hairs, spikelets \( \frac{1}{10} - \frac{1}{2} \) in, nerves of gl. I scaberulous above the middle tip 2-toothed or 2-aristulate, II acuminate or awned, IV obtusely 2-toothed, awn very slender. Hack. Monogr. Androp. 353. A. lancifolius, microphyllus, & minor, Hochst. in Flora xxxix. (1856) 188. Batratherum molle, Nees & Arm in Mag. Nat. Hist. l. c. 181, Wight Cat. n. 1686; Aitchis. Cat. Panjab Pl. 174. B Schimperi, Nees ex Hochst. l. c. 177. Pleuroplitis lancifolia, microphylla & Schimperi, Regel in Bull. Acad. Petersb. x. (1866) 747-756. Lucæa Schimperi, Steud. Syn. Gram. 414. Andropogon microphyllus, Trin. in Mem Acad. Petersb. Ser. VI. 1i. (1833) 275. A lancifolius, Trin. l. c. 271; Thw. Enum. Pl. Zeyl 368; Trim. Cat. Ceyl. Pl. 108. A. minor, Hochst l. c. 188. A. molle, Duthie Grass, N.W. Ind. 17. A. muralis, Herb. Ham. ex Wall Cat. n. 8828. A. multicaulis, Steud. l. c 383. Psilopogon Schimperi, Hochst. ex A Rich. Tent. Fl. Abyss ii. 447. Ps. Figarei, Figar. Ind. Sem. Hort. Gen. (1852), in Ann. Sc. Nat. Ser. III. xix. (1853) 370. Plogonatherum tenue, Edgew. in Journ. As. Soc. Beng. (1853) 181.

TEMPERATE HIMALAYA, from Kashmir, alt. 4-5000 ft. to Sikkim, alt. 5-11,000 ft; the Khasia Hills and southwd. to the Nilghibis. Burma, Collett. Ceylon, Thwastes.—Distrib. Tonkin, Afr. trop.

Except in the smaller size, hairy peduncles and rachis of the shorter spikes, small spikelets, and toothed top of gl. I, there is little to distinguish this from some of the states of A. ciliaris. Hackel indeed says that these are very closely allied.

Sect. II. TRICHATHERUM, Hack. Joints of rachis of spike obliquely truncate. Awn 10 in. long, capillary, flexuous.

# 9. A. jubatus, Hack. Monogr. Androp. 358.

The CONCAN? Stocks.

#### UNDETERMINABLE SPECIES.

BATRATHERUM, Wall. Cat. 8827 (Andropogon minutissimus, Herb. Heyne) ia a dwarf or very immature state and unrecognizable.

# 41. ISCHNOCHLOA, Hook. f.

(Genus not in the clavis, p. 4.)

A small, slender, straggling, flaccid, leafy annual. Leaves ellipticlanceolate, acute at both ends. Spikes solitary, simple, shortly exserted from the uppermost leaf-sheaths; rachis very slender, linear, flattened, with thickened margins, inarticulate. Spikelets 1-fid, minute, binate, a sessile and a pedicelled, lanceolite, both awnel and bisexual; callus minute, ciliate. Glum s 3 (III absent) 1 linear-oblong, subcoriaceous, 5-6-nerved, dorsally flattened, tip broadly by dine truncate irregularly 2-to-othed, margins incurved, keels ciliate. If oblong, keeled, obtuse or truncate, 3-nerved, ciliate towards the tip. IV much shorter, very narrow, cleit to the middle, lobes subulite, awn in the cleft, capillary, geniculate, pulse 0. Lolleules cuneate. Stimens 3, anthers oblong. Styles short, tiee. Grain subfusiform, terete, grooved one side.

A remarkable genus, with the hibit of Arterian (closely resembling A. microph dus), next which it may be provisionally placed, but not nearly related to it, differing in the marticulated list rachis of the simple spike, bisexual awned pedicelled spikelets, and absence of gl. III.

### I. Falconeri, Hook f in Hook. Ic. Pl. t. 2466.

NOBTH WESTERN HIMALATA; growing amongst moss, Falconer.

See, 8 6-8 in., very slender, sparingly branched, leafy to the tips, filiform; internodes concealed by the leaf-sheaths. Leaves 1-1 in., flat, acute or accuminate; sheath deeply farrowed, glabrous; ligide a few hairs. Spikes 1-1 in., very slender, green, pediuncle capillary as long as the leaf-sheath; rachis exactly linear, flexious, quite glabrous, not disarticulating at the transverse glabrous nodes. Spikelets 7, in long, rather longer and broader than the internodes; gl I with the 2 lateral (carrial) nerves only reaching the tip; II with a stout median nerve and 2 very slender lateral ones anastomosing with it below the tip.

### 42. THELEPOGON, Roth.

A coarse perennial grass. Leares lanceolate, base cordate, amplexicaul. Spikes few or many, corymbosely fascicled, peduncled, lower whorled, upper distant; rachis flexuous, fragile, joints more or less deeply excavated. Spikelets solitary at the joints, with the rigid pedicel only of an upper, ovoid, acute Glumes 4, I thickly corraceous, convex, beaked, transversely rugose ridged or tubercled; II sunk in the cavity of the joint, rigid, sparingly tubercled, acuminate; III shorter, hyaline, paleate, usually male; IV bisexual, hyaline, deeply bifid, with a long twisted awn in the sinus; palea narrow. Lodicules broad. Anthers 3, very long. Styles free, stigmas short. Grain narrowly oblong, free.

T. elegans, Roth. e.c. Roem. & Sch. Syst ii. 788. Nov. Pl. Sp. 62; Hack. Monogr. Androp. 267. Andropogon Princeps, A Rich. Tent. Fl. Abyss ii. 471, t 102. Rhiniachne Princeps, Hochst. ex Steud. Syn. Gram. 360 (in Syn.). Jardinea abyssinica, Steud. Syn. Gram. 360.

CENTRAL INDIA, the CONCAN and MALABAR. - DISTRIB Afr. trop.

Stems 6 in 3 ft, tusted and branching from the base, or woody as thick as a crow-quill lelow and geniculately branching upward; roots stout, rigid. Leaves 3-10 by \(\frac{1}{2}\) in hear, acuminate, rather thin, and sheaths glabrous scabrid or hispid with tubercie-based hairs, margins denticulate; ligule very short. Spikes 1-3\frac{1}{2}\) in, peduncle slender, stiff; rachis compressed, much narrower than the spikelets, of upper spikelets tubercled; joints as long as the spikelets, subclavate, scaberulous, top orbicular cupped. Spikelets \(\frac{1}{2}\) in, tellow or brown; callus annular, bearded; gl. I very thick, hard, beak echinate; II with usually one transverse row of tubercles; III broad, 2-nerved, glabrous; palea narrow, acute, nerveless; IV ovate-lanceolate, 3-nerved, glabrous; lobes lanceolate, 1-nerved; awn=3-4 gl. in

length; palea as long as the gl., oblong, acuminate, 2-nerved. Pedicel of arrested spikelets flat, scabrid.—Gl. III and its palea would appear to have exchanged their character of nervation. A curious gigantic state? collected by Ritchie at the Kola Nuddi Waterfall (in the Concan?) has the upper spikelets densely softly villous, gls. I and II thin hardly tubercled, the lower spikelets appear to be binate but are very imperfect.

### 43. LOPHOPOGON, Hack.

Small perennial densely tufted grasses. Leares very narrow. Spikes very short, solitary 2-nate or fascicled on the ends of capillary branches, very fragile; joints very short, slender, tips cupular. Spikelets small, homogamous or heterogamous, 1-2-fid., 2-3-nate, one sessile, callus conical villous. Glumes 4, I and II chartaceous, I oblong, broadly truncate, irregularly 3-4-toothed, 7-nerved, dorsally convex; II longer than I, lanceolate, narrowed into a straight awn, 3-5-nerved, hispidly villous on the sides, and with tufts of hairs dorsally below the middle; III hyaline, oblong-lanceolate, acute or aristulate, ciliolate, 1-nerved, 1-2-androus or neuter, palea linear 2-nerved; IV nearly as long as III, fein. or bisexual and diandrous, linear-oblong, 2-fid, lobes settiorm and margins hispidulous; awn in the cleft, much longer than the gls. tortuous and twisted; palea minute, quadrate, lobulate, 2-nerved. Lodicules O. Anthers narrow. Styles combined below, stigmas very long.—Species 2, Indian and a 3rd? Australian.

- In L. tridentatus the lower spikelets sometimes form a whorl at the apex of the peduncle as in Germainia. In this species also the upper spikelet is usually male or neuter. Hackel suggests the probability of Retz's Andropogon incurratus (Obs. v. 21 non Trin.) from Tranquebar, Koenig, being a Lophopogon.
- 1. L. tridentatus, Hack. in Engl. & Prantl. Nat. Pflanzenfam ii. II 56, Monogr. Androp. 254, t. i. f. 14; stem subsimple, spikes more or less closely sheathed. Lisboa in Bomb. Journ. Nat. Hist. vi. (1891) 201; O. Kuntze, Revis. Gen. 1. 197. Andropogon tridentatus, Roxb. Fl. Ind. i. 257; Steud. Syn. Gram. 372. Saccharum tridentatum, Spreng. Syst. i. 283.—Gen. Nov. Wall. Cat. n. 8842.

The CONCAN and CANABA, Heyne, &c. CENTRAL PROVINCES, Khandua, Duthie,

Stem 4-6 in. Leaves 2-4 in., rigid, 3-nerved; sheath short, upper ventricose; ligule obscure, ciliate. Heads of spykes  $\frac{1}{3}-\frac{1}{3}$  in.; sheaths ovoid, flattened, membranous, caudate-acuminate. Spikes  $\frac{1}{3}-1$  in. Spikelets  $\frac{1}{3}-\frac{1}{6}$  in., brown when dry; gl. I of lower spikelet dorsally naked, of upper with tutts of long bristles below the middle; II back and margins villous, with a pencil of hairs on each side about the middle.

O. Kuntze, l. c. has two varieties: a. Wrightii, Nees mss., with red hairs at the base of gl. I., and  $\beta$ . Munros, with none.

2. L. Kingii, Hook.f.; stem subcorymbosely branched above, spikes long-peduncled.

BEHAR; at Monghir, Herb. Hort. Calcutt.

Foliage and spikelets nearly as in *L. tridentatus*, but habit very different. The subcorymbose branches of the stem bear subulate leaves and capillary peduncles 1-2 in long embraced by almost filiform sheaths with accoular tips. *Spikes* solitary for two together, \(\frac{1}{2}\) in long, pale yellow-brown, fragile.—More materials are wanting for a trustworthy description of the inflorescence.

## 44. APLUDA, Linn.

A leafy perennial grass. Stems geniculately ascending from a creeping or decumbent base, sometimes scandent, paniculately branched. Leaves petioled, flat; sheaths of upper spathitorm. Inflorescence of very many solitary small simple spikes, terminating the stem and branches, each enclosed in a special membranous peduncled spathe, together forming a leafy panicle Spikes of one linear joint gibbously bulbous at the base, and jointed on the peduncle at the base of the spathe by a minute curved pedicel, rachis (joint) smooth. Spikelets 3, a sessile 2-fld. bisexual with a pedicelled imperfect (reduced to a small gl) at the base of the rachis, and a terminal male or neuter, rarely bisexual; sessile spikelet seated on the bulbous base of the rachis (callus of authors); gls. 4, I chartaceous convolute many-nerved margins not inflexed, II compressed 5-7-nerved dorsally gibbous keeled, III ovate-lanceolate hyaline male paleate, IV much smaller bisexual ovate paleate entire or 2-toothed, awned or not. Lodicules 2, cuneate. Stamens 3, anthers short. Styles free. Gram oblong, embryo large.

In the above description I consider what Hackel describes as the pedicel of the upper spikelet to be the rachis of the unmodal spike; and his callus of the sessile spikelet to be a bulbous inflation of the base of the rachis.

A. varia, Hack. Monogr. Androp. 196. A. aristata and mutica, Auct.—Apluda, Wall. Cat n. 8760, 8761.

Throughout India and Burma, ascending the Himalays to 8000 ft. CEYLON,

up to 4000 ft .- DISTRIB. E. trop. Asia. Malaya, Australia, Ins. Pacific.

Stem 1-7 ft. or more, solid, as thick as a crow-quill below; branches flexuous; roots wiry. Leaves 4-18 in., subbifarious, linear-lanceolate, cuspidately acuminate, base narrowed usually petioled, above and margins scaberulous, glaucous beneath, upper gradually shorter; sheaths glabrous, rarely hairy, upper shorter and diluted into spathes with subulate tips; ligule short, rounded. Spathes of the fig. branches about 4 in long, cymbiform, thin, many-nerved; of the spikes smaller, very variable in length, longer or shorter than their almost capillary peduncles. Spikes \(\frac{1}{2} \) \(\frac{1}{2}\) in., green or pale violet. Sessile spikelet \(\frac{1}{2} \) \(\frac{1}{2}\) in.—The following is Hackel's airangement of the very unstable Indian varieties of this polymorphous plant. It is especially useful as approximately classifying its intricate synonymy.

Subsp. MUTICA, Hack.; gl. IV very rarely awned; I straight glabrous; II dorsally gibbous keel depressed above the gibbosity acute glabrous; panicle usually lax, ultimate fig. branchlets usually half as long as the sheath.—A. mutica, Linn. Sp. Pl. 82; Gærin. Fruct. ii. t. 175; Lamk. Ill. t. 841, f. 1, Anderss. in Efvers. Vet. Akad. Stockh (1855) t. 5, f. 6. A. gigantea, Spreng. Syst. i. 290. ?A. glauca, Schreb. Beschr. Græs. 99. Å. geniculata, Rowb. Fl. Ind. i. 325. Andropogon glaucus, Retz. Obs. v. 20. Calaminea gigantea, Beauv. Agrost. 15, t. 23, f. 1.

Var. humilis; clusters of spikes distant, spathe of spike  $\frac{1}{3} - \frac{1}{4}$  in., sessile spikelet  $\frac{1}{3} - \frac{1}{4}$  in., callus  $\frac{1}{3} - \frac{1}{4}$  in., gl. I entire, imperfect spikelet hirsute. A. humilis, Kunth Enum. Pl. i. 517. A. Cumingii, Buese ex de Vivese Pl. Renw. 105. A. inermis, Regel in Act. Hort. Petrop. vii. (1880) 658. A. mucronata, Steud. Syn. Gram. 404. Caluming humilis, Roem. & Schult. Syst. ii. 810.

Subsp. ABISTATA, Hack. gl. IV of sessile spikelet cleft to the middle; I chartaceous; II dorsally less gibbous, keel sometimes scabridly ciliate often 2-mucronate; panicle dense, ultimate fig. branchlets shorter than the spathes, clusters of spikes close or confluent. A. aristata, Linn.

Cent ii. 7; Schreb. Beschr. Græs 93. Lamk. Ill t. 841, f. 1; Steud Syn. Gram 403; Roxb Fl. Ind. 1. 324; Dalz & Gibs Bomb. Fl. 303; Thw. Enum. Pl. Zeul. 364; Trim. Cat Ceyl. Pl. 108; Aitchis. Cat Panjab Pl. 174. Duthie Fodd. Grass. N. Ind. 44, t. 29. A. Gryllus, Beauv. Agrost. 133 (cf. corrigend. in Suppl.) t. 23, f. 5.

Var. aristata proper; spathe rather shorter than its spike, sessile spikelet  $\frac{1}{3} - \frac{1}{4}$  in., bulbous base  $\frac{1}{40} - \frac{1}{23}$  in., gl. I glabrous nerves scabrid, terminal spikelet = sessile, pedicelled spikelet minute. A. microstachya, Nees in Nov. Act. Nat. Cur. xix. Suppl i. (1843) 194. A. scabra, Anderss. l. c. 179. Ischæmum involucratum, Hb Russ. in Wall. Cat. n. 8794 A.

Var. ciliata; tall, robust, fig. spathes glabrous or hairy, spathe half as long as its spike, sessile spikelet  $\frac{1}{4} - \frac{1}{3}$  in., bulbous base  $\frac{1}{2} - \frac{1}{10}$  in., gl. 1 and rachis puberulous, spathe glabrous or with tubercle-based hairs. A. ciliata, Anderss. l. c. 177-179.

"Hardly a distinct variety," Hackel.

Var. villosu/a; spathe half as long as its spike, sessile spikelet  $\frac{1}{4}$  in., bulbous base of rachis  $\frac{1}{13}$  in., gl. I and pedicel scabious-pubescent, terminal spikelet shorter than the sessile, pedicelled spikelet  $\frac{1}{12}$  in. ciliate. A. communis, Nees & Arn. in Nov. Act. l. c. 194; Anderss. l. c. 177, t. 5, 2. A. villosa, Schreb. Beschr. Græs. 98?—Waght Cat. n. 1713.

Var. rostrata; spike strongly incurved far exserted beyond the spathe, spikelet \(\frac{1}{4}\) in, callus  $\frac{1}{8} - \frac{1}{8}$  in. A. 10strata, Arn. & Nees l. c. 194. Wight Cat. n. 1714. —

Apluda, Wall. Cat. n. 8762.

# 45. VOSSIA, Wall. & Griff.

A gigantic floating grass. Spikes terminal, solitary or 2- (rarely 3-6-) nate, stout, rachis narrow, compressed, flexuous, jointed. Spikelets 2-fld., imbricate, 2-nate, longer than the subexcavate joints, one sessile by a very broad callus; the other smaller pedicelled. Glumes 4, I very broad, ovate, flattened, coriaceous, smooth, narrowed into a long rigid green tail; II chartaceous, ovate-lanceolate, acute, 3-nerved, keeled above; III hyaline, 2-nerved, paleate, male; IV hyaline, oblong, 3-nerved, tip ciliate, palea 2-nerved. Lodicules large, toothed. Anthers 3, long. Styles distinct, stigmas short. Grain unknown.

V. procera, Wall. & Griff. in Journ. As. Soc. Beng. v. (1836) 573, t. 23, Wall. Cat n. 8878; Grant in Trans. Linn. Soc. xxix. 175, t. 116; Hack. Monogr. Androp. 270. V. cuspidata, Griff. Notul. 111. Index p. x11., Ic. Pl Asiat. Index p. v. t. 153. Ischæmum cuspidatum, Roxb. Fl. Ind. i. 324; Kunth Enum. Pl. i. 516; Griff. Notul. iii. 70. I. ensiforme, Herb. Ham. ex Wall. Cat. l. c.

Jheels of BENGAL, SILHET and ASSAM .- DISTRIB. Afr. trop.

Stem 6-12 ft., spongy, as thick as the thumb, rooting at the lower nodes, Leaves 1-2 ft., linear, acuminate, hispidulous, midrib stout; sheath large; ligule densely ciliate. Spikes 6-8 in., nearly terete; rachis narrower than the gls., margina ciliolate; joints \(\frac{1}{2}\) in., and pedicels cupped at the tip. Spikelets 1-1\(\frac{1}{2}\) in. with the spreading ciliolate tail of gl. I, green, callus annular.—Hardly generically different from Ischamum.

# 46. ROTTBOELLIA, Linn. f.

Tall, annual or perennial grasses. Spikes few or many, subsolitary or panicled rarely racemose or panicled; rachis usually fragile, jointa usually excavate at the tip. Spikelets 2- rarely 3-nate, one (rarely two)

sessile and both or one only perfect, the other pedicelled imperfect, with the pedicel often adnate to the joint. Sessile spikelets, glumes 4, I coriaceous, flat or slightly convex, obtuse or acute, rarely 1-2-awned; II thunner, keeled, III hyaline, neuter or male; IV hyaline, 1 or 3-nerved, usually paleate, palea usually 2-nerved. Lodicules 2, truncate. Stamens 3. Styles distant. Grain oblong or obovoid, subcompressed dorsally.— Species about 30, temperate and tropical.

I have followed Hackel for the most part in the disposition of the species of the first four sections of the genus. For my departure from him in the fifth see remarks under *Ophiurus* (p. 160).

- A. Sessile spikelets solitary in all the joints of the spike.
- Sect. I. Phacelurus, *Hack. Spikes* digitately racemed (rarely solitary), rachis fragile, tips of joints flat, not hollowed. *Spikelets* 2-fld.—Phacelurus, *Griseb.* (gen.)
- 1. **R.** speciosa, Hack. Monogr. Androp. 282, perennial, spikes solitary or alternate of subdigitately fascicled  $2-3\frac{1}{2}$  in long, spikelets  $\frac{1}{6}-\frac{1}{4}$  in. 1-fid, gl I flat 11-13-nerved. Ischæmum speciosum, Nees ex Steud. Syn. Gram. i. 375. Andropogon speciosus, Steud. l c. Vossia speciosa, Benth. in Journ Linn. Soc. xix. (2881) 70; Duthie Grass. N.W. Ind. 18, Fodd. Grass. N. Ind. 32.

WESTERN TEMPERATE HIMALAYA, alt. 5500-9000 ft., from Kashmir to Garwhal, Royle, &c.

Stems tufted, 1-4 ft., stout or slender, simple above. Leaves 6-12 by  $\frac{1}{4}-\frac{1}{2}$  in., linear, hispid or glabrate, margins scabild; sheath glabrous or margins above hany; ligule a ciliate border. Spikes 3-6 in, rarely solitary, glabrous, green or purplish; joints about as long as the spikelets, subclavate, trigonous, angles ciliate. Spikelets lar colate, glabrous, gl. I obtuse, tip oblique, margins narrowly inflexed, keels scaberulous; II navicular, acute; III lanceolate, 3-5-nerved; IV elliptic-lanceolate, 1-nerved.

- Sect. II. THYRSOSTACHYS, Hack. Spikes panicled, lower whorled, peduncled; rachis fragile, tips of joints hollowed. Spikelets 1-fid.
- 2. **R. Zea,** Clarke in Journ Lunn. Soc. xxv. (1889) 86, fig. 38; panicle thyrsiform or pyramidal, spikes smaller upwards, spikelets  $\frac{1}{6}$  in., gl. I scabrid 1-3-nerved. Hack. Monogr. Androp. 690. R. thyrsoidea, Hack. l. c. 283.

Khasia Hills, alt. 2-3000 ft., J.D.H. & T.T., Clarke. Munnepore, alt. 3500 ft., Clarke. Upper Burma; at Camein on the Mogaung river, Gruffith.

Stem tall, 6-8 ft., very stout, as thick as the forefuger below, erect, simple or sparingly branched, nodes silky. Leaves large, 2-3 ft. by 1-1½ in., linear, flat or complicate, glabrous, margins scabrid; sheaths subcompressed; ligule short, truncate. Panscle 10-20 in. long, long-peduncled, rachis very stout, strict. Spikes erectopatent, lower branched, sometimes distichously; rachis stout, flexuous or zigzag, joints about as long as the spikelets, subclavate, glabrous. Spikelets glabrous; gl. I obtuse, dorsally scabrid, 1-3-nerved, margins narrowly inflexed, keels scaberulous; II ovate, acute, 3-nerved; III lanceolate; IV oblong, obtuse.

Sect. III. HEMARTHRIA, Hack. Spikes solitary or fascicled, compressed; joints coherent or subfragile, tips obliquely or transversely truncate, not hollowed. Spikelets of each pair similar, pedicel of upper usually adnate to the joint of the rachis.—Hemarthria, Br. (Gen.).

3. **R.** compressa, Linn f. Suppl. 114; rachis of spike coherent, sessile spikelets  $\frac{1}{10}$  in., callus distinct, gl. I of sessile spikelets cornaceous obtuse or acute 7-9-nerved, gl. II of pedicelled acuminate or shortly awned 7-9-nerved.

Throughout the hotter parts of INDIA, generally in wet places, Burma and CEYLON.—DISTRIB. Westwards to Spain and the Canaries, and in most warm climates.

Erect or decumbent below, usually branched throughout, leafy; nodes glabrous or pubescent. Leaves short or long, linear, acute, margins and sometimes the upper surface scaberulous; mouth of sheath hairy. Spikes solitary or fascicled,  $2\frac{1}{4}$ -5 in. long, slender, erect, rurely branching; gl. I of pedicelled spikelets subulate or narrowly lanceolate, tip scabrid.—A polymorphous grass, whose Indian varieties are

disposed of as follows by Hackel .-

Var. a. genuma, Hack. l.c.; stems creeping below, then erect, scandent, 5-20 ft long (Roxb), spikes slender solitary or 2-3-nate, spikelets \( \frac{1}{2} \) in., gl. I broad ovate-lanceolate obtuse not constricted below the tip. R. glabra, Roxb. Fl. Ind. 1 353; Wall Cat. n. 8871 A. R. anceps & quarterna, Herb. Ham. ex Wall. l. c. B. C. Hemarthia compressa. Kunth Enum. i. 465 (in part); Gioth. Cat. Bomb. Pl. 233, Thw. Enum. Pl. Zeyl. 364; Trum. Cat Ceyl. Pl 107; Aitchis. Cat. Panyab. Pl. 172, Duthre Grass. N.W. Ind. 18, Fodd. Grass. N. Ind. 30. H. coromandelina, Steud Syn. 358.—Common in India.—Hackel does not notice Roxburgh's description of this grass as scandent, and attaining 20 ft. in

length.

Var. \$\mathre{B}\$. fasciculata\*, Hack.l.c.; stem 2-5 ft. creeping, then erect, upper spikes usually fascicled longer stouter often curved, spikelets \( \frac{1}{8} \cdot\) in., gl. I of sessile constricted below the tip. R. altissma, Poir. Voy. Barb. in. 105. R. compressa, Linn. f Suppl. 114; Retz. Obs. iii. 12; Roxb. Fl. Ind. i. 354. R. fasciculata, Lamk. Ill i. 204; Desf. Fl. Atlant t. 36. R. spathacea, Ten. Fl. Nap Prodr. p. 11. Lodicularia capensis, Nees Fl. Afr. Austr. 128. L. fasciculata, Beaux. Agrost. 108; Wight Cat. n. 1721. L. fastigiata, Herb. Beaux. (non Agrostogr.). L. laxa, Nees ex Steud. l. c. 358. L. peruviana, Meycn Reise, ii. 71. Lepturus fasciculatus, Trin. Fund. Agrost. 123. Hemarthria capensis, Trin. in Mem. Acad. Petersb. Ser. VI. ii. (1833) 248. H. caudiculata, Steud l. c. 359. H. fasciculata, Kunth Revis. Gram. i. 153, Enum 1. 465; Benth. Fl. Hongk. 418; Hack. in Mart. Fl. Bras. ii. 111, 314, t. 72, f. 2; Duthie Grass. N.W. Ind. 13, Fodd. Grass. N. Ind. 30. H. laxa, Steud. l. c. 358. —Hemarthria, Wall. Cat. n. 8871 (in part).—Common especially on the borders of pools often climbing amongst bushes.

Var. 5. japonica, Hack. l. c. 288; leaves with setaceous tips, upper spikes subfasciled stout, spikelets \(\frac{1}{2}\) in., gl. I sessile hardly constricted below the subobtuse tip 7-11-nerved, of pedicelled lanceolate not subulate —Hackel says of this Japan plant that "Wallich's n. 8868 B is exceedingly like it." But that number of

Wallich's Herb. is Ratzeburghia pulcherrima, and there is no B under it.

4. R. protensa, Hack. Monogr. Androp. 289; rachis of spike firm, sessile spikelet  $\frac{1}{5}$  in. lanceolate, callus obscure, gl. I subacute many-nerved, gl. II of pedicelled spikelet lanceolate narrowed into a long slender awn 1-3-nerved. R. repens, Roxb. mss. ex Wall Cat. Hemarthria protensa, Steud. Syn. Gram. 359. P. H. vaginata, Bihse Pl. Jungh. in. 354 (ex Hack.).—Hemarthria. Wall. Cat. n. 8872, 8910.

ASSAM, BENGAL, SILHET, CACHAR and the KHASIA HILLS, in marshes.

? LACCADIVE ISLDS., A. B Hume.

Stem 3-6 ft., erect from a decumbent base, stout, leafy, flowering from all the nodes Leaves 3-12 by \(\frac{1}{2}\)-\frac{1}{2}\) in., linear-lanceolate, acuminate, narrowed from below the middle to the base, surfaces and margins smooth, glabrous; sheath glabrous or hairy. Spikes 4-8 in., slender, joints shorter than the sessile spikelets, top transversely truncate; pedicels adnate to the joints. Sessile spikelets linear-lanceolate; gl. I

narrowed from the middle upwards; II more or less usually wholly adnate to the joint, IV very short or 0. Pedicelled spikelets, gl. I 7-nerved; II  $\frac{1}{3} - \frac{1}{2}$  in., keel excentric.—Very nearly allied to R. compress. "The only Androp. grass in which fruiting spikelets are not detached, hence there can be no dissemination except from the whole spike," Hackel. The Luccadive Islds. specimens are very slender with narrow leaves and quite erect strict lanceolate finely acuminate spikelets, rather longer than the joints.

Var. Hamiltoniana; callus of sessile spikelets bearded with short hairs. ? R. Hamiltoni, Trin. mss. ex Steud. Nom. Ed. II n. 474 R. compressa, Wall. Cat. n. 870 A. C. R. compressa var. Hamiltoniana, Hack. Monogr. Androp 288. Hemarthia Hamiltoniana, Steud. Syn. Gram. 358. Lodicularia Hamiltoniana, Nees ex Steud. l. c. 359.—Lower Gangetic Plain; Nathpur, Hamilton.—Referred to com-

pressa by Hackel, but I think nearer to protensa.

5. **R. longiflora**, Hook. f.; spikes short, rachis firm, sessile spikelets  $\frac{1}{3}-\frac{1}{2}$  in. lanceolate narrowed into a long point, callus obscure, gl. II rather longer subaristate, pedicelled spikelets like the sessile.

TENASSEBIM; at Mergui, Griffith. Assam, Herb. Munro.

Stem 1-2 ft., erect, leafy, stout, spongy; nodes glabrous or pubescent. Leaves 3-6 by \( \frac{1}{2} \) in., linear-lanceolate from a rounded base, flaced, smooth, glabrous, margins smooth; sheath inflated; ligule short, membranous. Spikes 4-6 in., sheathed below, stout, nearly \( \frac{1}{2} \) in. across the spikelets; rachs subtetragonous. Spikelets twice as long as the joints, the pedicelled rather longer and longer awned than the sessile; gl. II adnate to the joint; III of sessile spikelet oblong, obtu-e, nerveless; IV like III, palea small. Lodicules quadrate, broader than long, membranous. Gl. IV of pedicelled spikelet narrower (han the sessile, paleate, with imperfect stamens and pistil.—Resembles a very large state of R. protensa.

- Sect. IV Peltophorus and Cœlorhachis, Hack. Spikes solitary or fascicled, fragile, terete or compressed, joints transversely (rarely obliquely) truncate, deeply hollowed, dorsally convex, ventrally excavate, pedicel of upper spikelet free or adnate to the joint of the rachis, tip hollowed. Peltophorus, Desv. (Gen.).
  - \* Gl. I of sessile spikelets broadly winged.
- 6. **R. Myurus**, Benth. in Journ. Linn. Soc. xix. (1881) 68; perennial, gl. I of sessile spikelet panduriform dilated above the middle into an orbicular wing, and towards the base into two auricles joined by a transverse ridge. Hack Monogr. Androp. 290. Manisuris Myurus, Linn. Mant. ii. 300; Desv. ex Beaux. Agrost. 14, t. 1; Rottl. in Neue Schrift. Nat. Fr. Berl iv. (1803) 191; Roxb. Corom. Pl. ii. 10, t. 117, Fl. Ind. i. 351; Schreb. Beschr. Graese, t. 43; Kunth Enum. Pl. i. 470; Griff. Notul. iii. 100; Myg. Fl. Ind. Bat iii. 410. Peltophorus Myurus, Desv. in Nouv Bull Soc. Philom. ii. (1810) 188. Journ Bot. i. (1813) 73; Beauv. Agrost. 119, t. 21, f. 11.; Wall Cat. n. 5880; Wight Cat. n. 1725, Herb. n. 3071. Ischæmum, Myurus & Ægilops sanguinea, Herb. Linn.

The Deccan Peninsula, Heyne, Wight, &c., in dry places.

Stem creeping and rooting, with ascending compressed branches 6-28 in. high. Leaves 2-6 in., spreading, linear, acute, flat, glabrous; sheath compressed, margins ciliate; ligule short, ciliate. Spikes 1-2 in, solitary, terminal and axillary, shortly exserted; joints scaberulous, shorter than the spikelets, excavate on each side leaving a pore between the spikelet and joint. Sessile spikelets to in., brown, callus minute; gl. I scaberulous, 5-nerved, wing scarious; II ovate, acute, 3-nerved; III oblong, obtuse, empty; IV lanceolate, nerveless; palea obsolete. Pedicelled spikelets; gl. I oblong, obtuse, 5-nerved, winged on one side; II navicular, 3-nerved; III 3-nerved, paleate; IV oblong, obtuse, male; pedicel free or adnate to the joint.

7. R. acuminata, Hack. Monogr. Androp. 291; annual, spikes short, gl. I of sessile spikelet broadly ovate acuminate winged above the middle, coriaceous below it with 3 to 6 dorsal transverse echinulate or warted ridges.

The DECCAN PENINSULA, G. Thomson; N. Canara; Carwar, Talbot.

Stem 3-12 in , ascending from a creeping base, compressed, leafy. Leaves flaccid, lower 2-3 in., linear-lanceolate from a narrow base, acuminate, upper shorter spreading and recurved; sheath turgid, compressed, keeled, mouth hairy; ligule short, truncate, glabrous. Spikes 1-2 in.; joints subclavate, much shorter than the sessile spikelets, base not excised. Sessile spikelets \(\frac{1}{4-\frac{1}{3}}\) in., callus obscure; gl. I 5-nerved in the narrow coriaceous part between the wings; II elliptic-lanceolate, acute, 3-nerved; III elliptic, paleate, male; IV short, oblong, obtuse; palea small, 2-lobed, nerveless \(Pedicelled \) spikelet; gl. I winged on one side, 5-nerved, base not tubercled; II 3-nerved; IV male, lanceolate, many times longer than the joint.

Var. Stocks:; diffusely branched from the root, gl. I of pedicelled spikelet \( \frac{1}{2} \) in. subulate-lanceolate erect or recurved narrowed into a slender scaberulous awn not or obscurely winged.—Malwar, Stocks.—The long gls. of the pedicelled spikelets give this variety a very different appearance, but intermediates occur, and the specimens

were mixed with those of R. acuminata proper.

8. R. divergens, Hack. Monogr. Androp. 293, annual, spikes short, gl. I of sessile spikelet crossed below the middle with echinulate ridges ovate 2-mucronate or 2-aristate with broad hyaline wings above the middle. Lisboa in Journ. Bomb. Nat. Hist. Soc. vi. (1891) 195.

EAST INDIES, Huegel. The CONCAN and CANARA; Belgaum, Ritchie; Satara and Mahableshwar, Lusboa

Stem 4-10 in., erect or ascending, slender, terete, nodes 2-3 all with 2 nate flowering branches. Leaves 1½-1½ in., narrowly linear, hairy beneath and on the margins; sheath complessed, naked, hairy; ligule short, membranous, rounded. Spikes about ½ in., slender, erect, pale; joints shorter than the spikelets, subclavate, excised, outer margins of the cavities chiate. Sessile spikelets; \(\frac{1}{10}\)-\frac{1}{2}\) in., broadly oblong, dorsally with 7 lines of small pits (Hackel) or rugose with long or short transverse tubercled or echinate ridges or crests, mucros or awns erect scabrid sometimes as long as the spikelet; II shorter, ovate, acute, keeled, 3-nerved, III broadly ovate, nerveless, empty; IV=III, ovate-oblong, obtuse, nerveless. Pedicelled spikelets lanceolate; gl. I smooth, 5-nerved, bloadly inflexed on one side with a winged keel, on the other produced into a mucro; II lanceolate, acute, keel winged; pedicel adnate.—The ridges on gl. I of the sessile spikelet are very variable, and are sometimes replaced as it were by vertical rows of incurved spinules on the nerves.

9. **R. Talboti**, Hook. f. (non Lishon); annual, leaves linear, spikes solutary short, gl. I of sessile spikelet lanceolate narrowed into a slender scabrid awn, and with 3 transverse ciliolate ridges towards the base broadly winged above it, pedicel of upper spikelet adnate to the joint of the rachis.

GOA DISTRICT, Talbot.

Stems 6-8 in, slender, erect or base geniculate, subsimple. Leaves 2-3 in., narrow, smooth; sheath glabrous; ligule short, membranous. Peduncles 2-3 in., very slender, flexnous. Spikes & in. duam., green, joints very short, tumid, excavate opposite the spikelet, top broad, cavity very large, margins thick hispidulous. Spikelets closely imbricating, & in. long including the awn; callus annular, ciliolate; gl. I of sessile spikelet many-nerved on the coriaceous disk; II much shorter, hyaline, ovate-oblong, acute, 1-nerved; III broadly oblong, tip rounded, faintly 3-nerved, male; IV small, oblong, obtuse, nerveless, palea as long nerveless. Pedicelled

spikelets as long as the sessile; gl. I very unequally winged, dorsally smooth, awn as in the sessile; pedicel wholly adnate to the joint of the rachis.

10. R. Clarkei, Hack. in Estr. Bot. Zeitschr. xli. (1891) 8; annual, leaves lanceolate base cordate, spikes solitary short, gl. I of sessile spikelet orbicular-oblong dorsally gibbons and scabrid below the middle winged above it, tip notched, pedicel of upper spikelet quite free. R gibbosa, Hack ex Lisboa in Bomb. Journ. Nat. Hist. vi. (1891) 195. R. Talboti, Lishoa mss. L. c.

BEHAB, on Parusnath; and Hazaribagh, in Chota Nagpore, alt. 2000 ft., Clarke.

BOMBAY; N Kundra District, Talhot, Lisboa.

Stem 6-8 in., branched, crect, compressed. Leaves 3-5 by \( \frac{1}{4} \)-\frac{1}{3} in., acuminate, glabrous or hairy; sheath ciliate, ligule of hairs. Spikes \( \frac{1}{2} \)-1 in., erect, rachis tragile, joints clavate shorter than the spikelets, tips ciliolate, side not hollowed. Spikelets \( \frac{1}{10} \)-\frac{1}{2} in., closely imbricating Gl. I of sessile spikelet with a conaccount of the control of the contro 3-5-nerved disk and ciliate hyaline wings; II much smaller, ovate, 1-nerved, III ovete, obtuse, hyaline, nerveless; IV much smaller, broadly oblong, obtuse, nerveless, sides incurved, palea like the gl. nerviless. Pedicelled spikelet like the sessile, but smaller and less gibbons; pedicel pyriformly clavate, truncate, top scaberulous

- \*\* Gl. I of sessile spikelet winged at the tip only or narrowly on the margins.
- 11. R. exaltata, Linn. f. Suppl. 114; annual, leaf-base narrow rounded tip setaceous, gl. I of sessile spikelet very coriaceous about as long as the joint obtuse hardly margined or winged dorsally flat smooth, pedicels of upper spikelet shorter than the joints. Kunth Enum Pl. 1. 466; Hack. Monogr. Androp. 294; Steud. Syn Gram. 361; Roxb. Corom. Pl. ii. 30, t. 157, Fl Ind. i. 354; Grah. Cat. Bomb. Pl. 233; Thw. Enum. Pl. Zeyl. 364, Trim. Cat. Ceyl. Pl. 107; Aitchis. Cat. Panjab. Pl. 172; Duthie Grass. N.W. Ind 17; Lisboa in Bomb. Journ. Nat. Hist. vi. (1891) 196; Miq. Fl. Ind. Bat iii. 406, Br. Prodr. 206; Benth. Fl. Austral vii. 513, Baker Fl. Maurit. 457; Wall. Cat. n 8875; Wight Cat. n. 1724, Herb. R. arundinacea, Hochst. ex A. Rich. Tent. Fl. Abyss. ii. 444; Steud. n. 3286 l. c. 362. R. denudata, Steud.; Mig. l. c. 408. R. gymnorhiza, Herb. Ham. ex Wall. Cat n. 8875. R. hispida, Herb. Roxb. R. setosa, Presl Rel Hænk. Ophiurus appendiculatus, Steud. l. c. 359. Stegoasia cochinchinensis, Lour. Fl. Cochinch. 51.

Plains and lower hills of India, from the N.W Provinces to Assam and Burma (ascending the HIMALAYA in Garwhal to 7000 ft.), and southward to Travancore and CEYLON. ANDAMAN ISLDS., Prain .- DISTRIB. China, Malaya, Australia, Africa.

Stems 6-10 ft., stout, erect, spongy within, as thick as the little finger below and hispid. Leaves 6-24 by 1-1 in., linear-lanceolate, setaceously acuminate, scabrid or hispid above, margins scabrid; sheath hispid with tubercle-based hairs or glabrate. Spikes 3-6 in., stout, cylindric below, much narrowed with imperfect spikelets above : joints smooth, scaberulous. Sessile spikelets 1-1 in.; gl. I ovate-oblong, 2-fld, keels scaberulous narrowly winged, entue or emarginate, II broadly ovate, chartaceous, convex, 9-11-nerved, keel scubrid; III elliptic, 3-nerved, male, margins inflexed; IV shorter, convex, ovate, acute or mucronate. Pedicelled spikelets with the pedicel usually adnate by one margin to the joint, 1-2-fld. or neuter.

Var. robusta; leaf-base more cordately confluent with the sheath, spikes stouter below, slender above the middle, spikelets in upper half distichously imbricate longer than the joints, fertile nearly to the tip, palea of gl. IV auricled at the base .-Malahar and at Palamcotta, Wight Herb. n. 3286; Wall. Cat. n. 8875 E. Poona,

Woodrow.

12 R. nigrescens, Thw. Enum. Pl. Zeyl. 364; leaf-base cordate, spike fragile, gl. I of sessile spikelet ovate-oblong very obtuse or 3-lobulate dorsally tessellately foveolate obscurely 2-winged in the upper third or tip. Hack. Monogr. Androp. 296; Trim. Cat Ceyl. Pl. 107.

CEYLON: Central Province, alt. 4000 ft., Thwartes.

Stem tall, suberect, slender, glabrous. Leanes 4-8 in, linear-lanceolate, glabrous or sparsely hairy, margins scabrid, base ciliate; sheath glabrous or sparsely hirsute; liqule rounded, ciliate. Spikes 2-3 in., solitary or 2-nate, axiliary and terminal; joints as long as the spikelet, stout, margins smooth. Sessile spikelets \( \frac{1}{6} \) in., ovate-oblong; gl. I ovate, 9-nerved, wings scanious; II elliptic, obtuse, gibbous, keel winged below the tip; III hyaline, oblong, obtuse, paleate, nerveless; IV elliptic, obtuse, emarginate Pedicelled spikelets; gl. I smooth, striate, winged above on one side, 7-9-nerved; II 5-nerved, keel excentric, winged; III and IV as in the sessile spikelet; pedicel adnate to the joint.

13. R. striata, Nees ex Steud. Syn. Gram 361; leaf-base narrowed, spikes fascicled, often on very long peduncles, gl. I of sessile spikelet oblong-lanceolate shortly winged below the tip dorsally smooth with 4-6 often interrupted grooves below the middle. Huck. Monogr. Androp. 301.—Wall. Oat. n. 8876. 8877.

SIRKIM HIMALAYA, alt. 1-4000 ft., J.D.H., &c. SILHET and the KHASIA

HILLS, Wallich, &c BURMA and SINGAPORE, Wallich, &c.

Stem 3-4 ft., slender, thickened under the spikes, smooth, branched above Leaves 2-4 ft. by \(\frac{1}{2}\)-2 in., linear-lanceolate, setaceously acuminate, flat, midrib blood; sheaths glabrous, upper spathiform; ligule very short, membranous. Spikes 1-2 in., pale, slender, terete, glabrous. Sessile spikelets as long as the joints; callus annular, glabrous; gl. I obtuse, convex, many-nerved within, keels smooth; II chartaceous, ovate, subacute, acutely keeled, 1-nerved. III ovate, acute, hyaline, nerveless, paleate, IV ovate, faintly 1-nerved. Pedwel of upper spikelet linear, flattened, free or \(\frac{1}{2}\) or wholly adnate to the joint, tip hollowed, circular or compressed. Hacked has two subspecies.

Subsp. genuina; leaves 1-2 ft. by  $\frac{1}{3}-\frac{2}{3}$  in., spikes in a simple lax panicle, joints of rachis scaberulous, sessile spikelets  $\frac{1}{3}$  in., pedicelled spikelets of one long obtuse glume winged on one side.—Of this there are two vars, a. glabruor, stems and surfaces of leaves quite glabrous, margin of leaves and sheaths ciliate.—Singapore and Tavoy; and  $\beta$ . pubescens, stem above and surfaces of leaves pubescent.—

Khasia Hills.

Subsp khasiana; stem very tall much branched, leaves 3-4 ft. by 1-2 in., spikes 1-1½ in. in a compound panicle; joints smooth, sessile spikelets ½ in., gl. I more broadly winged, pedicelled spikelet ½ in., oblong. R. khasiana, Munro mss.—Sikkim and the Khasia Hills.

14. R. glandulosa, Trin. in Mem. Acad. Petersb. Ser. 6, ii. (1833) 250; perennial, spikes fragile, sessile spikelets ovate-lanceolate, gl. I narrowly winged in the upper third, dorsally scaberulous, margins below with on each side 5-7 upcurved mucros or tubercles. Hack. Monogr. Androp. 302; Miq Fl. Ind. Bat. iii. 408. Cælorachis muricata, Brongn. in Duperr Voy. Bot. i. 65, t. 14. Ophiurus muricatulus, Steud. in Zoll. Syst. Verz. 57, Syn. Gram. 360.—Rottboellia?, Wall. Cat. n. 8887 B.

BURMA, Wallich. MALAY PENINSULA; Singapore, Wallich; Malacca, Griffith;

Perak, King's Collector; Pahang, Ridley .- DISTRIB. Java, Philippines.

Stem 3-8 ft., tall, stout, branched, nodes pubescent or bearded. Leaves 2-3 ft. by 1-1 in., linear, caudate-acuminate, base usually fimbriate, margin scabridly servalate; sheath bearded at the mouth; ligule densely hairy. Spikes many, 21-4 in., slender, terete, pale or violet. Sessile spikelets 1-1 in., 1-fld, rather shorter than the glabrous joints; gl. I flat, obtuse, dorsally scaberulous; II charta-

ceous, elliptic-lanceolate, ciliolate; III ovate-oblong, obtuse; IV hyaline, 3-nerved; palea truncate, nerveless. Pedicelled spikelets reduced to a solitary gl. winged on one side, rarely with a second; pedicel adnate to the joint of the rachis.-A solitary specimen of a closely allied, I think, undescribed, species from Rangoon, McLellani, has caudate acuminate leaves, solitary spikes, sessile spikelets longer than the joints, gl. I narrowly oblong, margins smooth.

15. R. Helferi, Hook. f.; perennial, spikes solitary fragile subsessile in the sheaths, joints very short pyriform, sessile spikelets longer than the joints, gl. I ovate obtuse narrowly winged above the middle, back and sides smooth.

TENASSERIM, Helfer.

Stem 1-2 rt., slender, erect, from a nodose stock, sparingly branched above; nodes faintly bearded. Leaves 1-2 ft. by \(\frac{1}{2}\)-\frac{1}{2} in., erect, linear from a hardly narrowed base, finely acuminate, hairy on both surfaces; sheath glabrous, bearded at the tip. Spikes 1-4 m., slender, erect; joints  $\frac{1}{12}$  in., excavate on one side, base shortly hairy. Spikelets  $\frac{1}{3}$  in.; gl. I broadly ovate, narrowed suddenly above the middle, smooth, glabrous, or slightly pubescent on the sides below, wings serrulate; II ovate, acummate, chartaceous, 1-nerved, keeled, faintly obliquely winged above, III broadly ovate, obtuse, hyaline, faintly 3-nerved, palea small 2-toothed; IV ovate, obtuse or subacute; palea broad, truncate, 2-nerved. Pedicel of upper spikelet longer than the joint, linear, flattened, strongly 2-nerved, cilcolate at the base; spikelet reduced to a minute ovate glume.

B. Sessile spikelets geminate in all but the uppermost joints of the spike.

Sect. V. MNESITHEA, Kunth (genus).

16. R. perforata, Roxb. Pl. Corom. ii. 43, t. 182, Fl. Ind. i. 356; leaves very narrow, spikelets glabrous, pedicelled spikelets reduced to a minute gl. R. lævis, Retz. Obs. iii. 11; Steud Syn. Gram 362. Ophiurus perforatus, Trin. in Mem. Acad. Petersb Ser. 6, ii. (1833) 246; Hack. Monogr. Androp. 319. O. lævis, Benth. in Journ Linn. Soc xix. (1881) 69; Trim. Cat. Ceyl. Pl. 107; Duthie Grass. N.W Ind. 17, Fodd. Grass. N. Ind. 29; Lisboa in Bomb. Journ. Nat. Hist. vi. (1891) 193. Mnesithea. levis, Kunth Revis. Gram. 1. 154, Enum. Pl. i 466, Suppl. 375, t. 18, f. 3; Thv. Enum. Pl. Zeyl. 364; Wall. Cat. n. 8873; Wight Cat. n. 1722; Attchis. Cat. Panjab. Pl. 172. Hemarthria? perforata, Kunth l. e. 453, Enum. i. 465. Diperium cylindricum, Desv. Opusc. 76, t. 6, f. 3. Thyridostachyum læve, Nees in Lindl. Introd. Nat. Syst. Ed. II. 379. Ægilops cuneata, Herb. Roxb.

Throughout India, from the Indus to Burma and southward to Crylon.-DISTRIB. Affghan., Java.

Stem 2-4 ft., rather slender, simple or branched above; nodes few. Leaves 6-30 by & in., flat (conduplicate in vernation), linear from a narrow base, glabrous or base hairy, upper acute, lower obtuse, margins scaberulous; sheath terete; ligule very short. Spikes 4-8 in., shortly exserted, joints semi-cylindric, excavate on opposite sides with the pedicel of the imperfect spikelets between the opposite fertile spikelets. Spikelets 1-1 in.; gl. I oblique, smooth or pitted above the base.

17. **R. merguensis**, Hook. f.; leaves  $\frac{1}{2}$  in broad, spikelets glabrous. pedicelled spikelet minute imperfect.

TENASSERIM; Mergui, Griffith, Helfer.

Habit of R. perforata, but at once distinguished by its greater size, and broad leaves which attain an inch in breadth with the tip finely acuminate, base rather narrowed, margins chiate below the middle or towards the base only, both surfaces glubrous; sheath with glabrous or cliate margins. Spikes 2-3 in., long peduncled; top of peduncle slightly clavate; joints \( \frac{1}{3} \) in, about as long as the spikelets, clavate, quite smooth. Sessile spikelets ovate-oblong, winged at the top, quite smooth or with a few linear impressed pits, margins naked or obscurely ciliate.

18. R. geminata, Hack. in Œstr. Bot. Zeit. xli. (1891) 48; gl. I of sessile spikelets hirsute below with tubercle-based hairs.

MALAY PENINSULA; Pahang, Ridley.

Stems upwards of 2 ft. high, sparingly branched and flowering above; nodes bearded with reflexed hairs. Leaves 12 by \$1-\$\frac{1}{2}\$ in., linear, acuminate, rigidulous; sheaths appressed, mouths bearded; ligule short, membranous. Spikes about 2\frac{1}{2}\$ by \$\frac{1}{2}\$ in., green, fragile; joints about \$\frac{1}{2}\$ in., shorter and as broad as the spikelets, clavate, dorsally convex, ventrally and the tops deeply hollowed. Spikelets \$\frac{1}{2}\$ in., separated by the narrow pedicel of the withering upper spikelets, dimidiate-ovate, glabrous, callus annular; \$\frac{1}{2}\$. I coraceous, acuminate, narrowly winged at the top on each side, margins narrowly inflexed, nerves many very slender, hairs white; II as long as I, ovate, subulate-acuminate, keeled, chartaceous; III shorter, hyaline, ovate, acuminate, empty, nerves 0; IV 1-nerved; palea like its \$\frac{1}{2}\$.—Description from Hackel; I have not seen it.

#### UNDETERMINABLE SPECIES.

R. VILLOSA, Poir. Encycl. vi. 313; is, according to Hackel (Monogr. Androp. 313), probably an Ischæmum or Andropogon.

### 47. MANISURIS, Sw.

Annual, erect, much branched grasses. Leaves cordate at the base. Spikes terete, solitary, axillary and terminal, peduncles often confluent in a leafy spiciform panicle; rachis fragile; joints short, deeply excavate, tips with 2 pits. Spikelets 1-2-fld, in dissimilar pairs, one globose, sessile, bisexual; the other ovate, pedicelled, neuter, pedicel adnate to the joint of the rachis. Sessile spikelet; glumes 4, I hard, globose, foveolate, with an oblong opening opposite the rachis; II chartaceous, immersed in the cavity of I and filling the opening; III hyaline, empty; IV and its palea hyaline. Lodicules 2, broadly cureate. Anthers minute. Styles free, stigmas short, exserted from the opening in gl. I. Grain subglobose.—Species 2, tropical.

1. M. granularis, Linn. f. Nov. Gram. Gen. 37, f. 7, fig. 4-7; sessile spikelets globose deeply pitted smooth between the pits, gl. II 1-nerved. Sw. Prodr. Veg. Ind. Occ. 25 (partim), Fl. Ind. Occ. i. 186; Gærtn. Fruct. ii. 468, t. 175; Beauv. Agrost. 119, t. 21, f. 10; Roxb. Pl. Corom. ii. 11, t. 118; Kyvil. Enum. Pl. 1. 469; Hack. Monogr. Androp. 314; Steud. Syn. Gram. Grah. Cat. Pl. Bomb. 234; Dalz. & Gibs. Bomb. Fl. 300; Griff. Notul iii. 101, Thw. Enum Pl. Zeyl. 364; Trim. Cat. Ceyl. Pl. 107; Duthie Grass. N. W. Ind. 18, Fodd. Grass. N. Ind. 29, t. 46; Lisboa in Journ. Bomb. Soc. Nat. Hist. vi. (1891) 196, Benth. Fl. Austral. vii. 511; Mig. Fl. Ind. Bat. iii. 409, Griseb. Fl. Brit. W. Ind. 557; Doell. in Mart. Fl. Bras. ii. II. 46; Wall. Cat. n. 3879; Wight Cat. n. 1726. M. polystachya, Beauv. Fl. Owar. & Ben. 1. 24, t. 14. M. hirta, Herb. Russ. ex Wall. Cat. l. c. Cenchrus granularis, Linn. f. Mant. ii. App. 575.

Throughout the hotter parts of INDIA, from the Panjab eastward to Burma, and

southward to CEYLON -DISTRIB. Most tropical countries.

Stem 1-2½ ft. and leaves softly hairy, leafy to the top, as thick as a crow-quill. Leaves 4-10 by  $\frac{1}{4}$ -½ in., flaccid, flat, acuminate; sheaths hirste, inflated; ligule a raised ciliate margin. Spikes  $\frac{1}{4}$ -1 in.; peduicle filiform. Sessile spikelets  $\frac{1}{10}$  in. diam., superposed like minute beads on the rachis, and each as it were bracteate by the upper spikelet of the pair below it.

2. M. porifera, Hack. in Estr. Bot. Zeitschr. xli. (1891) 48; sessile spikelets broadly oblong truncate deeply broadly pitted, gl. I 5-nerved between transverse longitudinal ridges, II 3-nerved.

SIKKIM HIMALAYA; Dikeeling, alt. 3000 ft., Clarke. Tenasserim, Helfer.

Habit and foliage, &c of M. granulars. Spikelets  $\frac{1}{12}\frac{1}{10}$  in, brownish; callus smooth or foveolate; gl. I excised at the base on both sides, leaving a rounded pore between it and the rachis.—There is a specimen of this in Herb. Wight, without name or locality.

### 48. OPHIURUS, Gærtn.

Annual or perennial grasses. Spikes solitary or fascicled, terete, fragile; joints excavate, top concave. Spikelets 2-fld., solitary and sessile in the joints (with no upper or pedicel of one), not awned. Glumes 4, I thickly coriaceous, convex, obtuse; II almost membranous, concave, keeled; III elliptic, obtuse, hyaline, faintly 2-nerved, margins infolded, paleate, male; IV as long as III, oblong, obtuse, -nerved, paleate bisexual, palea narrow; IV oblong, obtuse. Lodicules 2, cuneate. Stumens 3. Grain oblong, free.—Species one or two. Tropical Asiatic and African.

Ophiurus, as defined by Hackel and Bentham, is an artificial genus, of which the original species, O. corymbosus, has solitary sessile 2-fid. spikelets on each joint of the spike, with no obvious traces of a second, by which character it differs from Ratiboellus. Of other Indian plants referred to it, O. perforatus (Rottboellua perforata, Roxb.) has 2 sessile 1-fid. spikelets on each joint of the spike, with a long interposed pedicel of a second perfect or imperfect one. It is the genus Mnesithea of Kunth. Two admitted species of Rottboellua have the same structure as O. perforatus, namely, R. hirsuta, Forsk., and R. geminata, Hack. These three should form either a separate genus (Mnesithea), or a section of Rottboellua, which latter course I have adopted. Hackel describes the joints of O. corymbosus as being thickened on one side by the presence of the confluent pedicel of a second spikelet, but I find no trace of this (nor can Dr. Stapf), and he describes R. perforatus as with one sessile spikelet on each joint, or with two on the lower joints only; but I find that in all the specimens two sessile spikelets is the normal condition almost throughout the spikes, the uppermost joints alone having but one.

O. corymbosus, Gærtn f. Fruct. iii. 4, t. 181, f. 3 a (Ophiuros); Kunth Enum. Pl. i. 464; Hack. Monogr. Androp. 317; Steud. Syn. Gram. 359; Wall Cat. n. 8874; Wight Cat. n. 1723, Duthie Grass. N. W. Ind. 17, Fodd. Grass. N. Ind 29, t. 55; Lisboa in Bomb. Journ. Nat. Hist vi. (1891) 193; Benth. Fl. Austral. vii. 512. Rottboellia corymbosa, Linn. f. Suppl. 114; Rowb. Pl. Corom. ii. 42, t. 181, Fl. Ind. i. 355; Grah. Cat. Bomb. Pl. 233. R. punctata, Retz. Obs. iii. 11. Ægilops exaltata, Linn. Mant. ii. App. 575; Retz. l. c. ii 27.

Dry hills, ascending to 3500 ft. in the Himalaya and Khasia Hills, and southward to the Deccan Peninsula (not in Ceylon).—Distrib. Toukin, Australia.

Perennial. Stems erect from a tuberous base, 5-6 ft., as thick as a goose-quill

below, solid, branching upwards, leafy throughout. Leaves  $\frac{1}{2}-2$  ft. by  $\frac{1}{2}-1$  in., flat (convolute in vernation), linear-lanceolate from a rounded base, finely acuminate, hally above, margins spinulose; sheaths short, terete, upper leafless; ligule very short. Spikes corymbosely fascicled, 2-5 by  $\frac{1}{12}$  in. diam., erect, often in very dense fascicles, shortly pedunded; joints as long and broad as the spikelets, tips obliquely truncate. Spikelets ovate-oblong, obtuse, glabrous, gl. I smooth or scrobiculate, at length recurved.

### 49. RATZEBURGIA, Kunth

A tufted slender perennial grass. Spikelets 1-fld., superposed in opposite pairs on a slender simple compressed subfragile spike, each pair sessile on a joint of the rachis, dorsally strongly compressed and appressed face to face (looking like one), rachis prolonged along the margins of the pairs on one side, and with the rachilla of a neuter along the opposite edges. Glumes 4, I thickly conaceous, flat, oblong, deeply pitted, terminated with 2 erect conaceous wings, margins strongly tubercled; II thinly coriaceous, lanceolate, acute, glabrous; III oblong, obtuse, hyaline, epaleate; IV smaller, epaleate. Lodicules obliquely quadrate. Anthers 3, short. Stigmas long.

R. pulcherrima, Kunth Revis. Gram. ii 487, Enum Pl. i. 468; Wall. Pl. As Rar. 111. 253, t. 273 (Aikinia), Cat. n. 8868; Hack Monogr. Androp. 321. Ophiurus auriculatus. Trin. in Mem. Acad. Petersb. Ser. VI. ii. (1833), 246. Aikinia elegans, Wall. l. c.

BURMA; at Paghan and the Petroleum Wells, Wallich; Upper Burma, Collett.

Stoloniferous; stem 6-18 in, geniculate and leafy below. Leaves 1-3 in., narrow, flat, margins thickened, tip rounded, sheath compressed; ligule short. Spike 1-2 in., § in. broad; peduncle very slender with 2-3 long-sheathed leaves below; joints and pedicels of neuter alike, incurved, obtusely angled, bearded along the inner angle and the hammer-headed top. Spikelets about § in.; wings of gl. I earlike, sublobed.

# 50. ELIONURUS, Humb. & Bonpl.

Aromatic grasses. Spikes solitary, subsimple, clothed with silky hairs, rachis flattened, jointed, fragile. Spikelets 2-nate, a sessile and pedicelled; joints compressed, margins thickened, tips obliquely truncate. Sessile spikelets (orally compressed, 1-fld.; glumes 4, I coriaceous, entire or 2-fid, embracing II by its margins; II narrower, membranous; III hyaline, empty, paleate or not; IV small, hyaline, paleate or not, awn 0. Lodicules obliquely quadrate. Anthers 3, short. Styles short, free. Grain narrow, plano-convex, free.—Species about 15, tropical and subtropical.

Hackel observes that Elionurus differs from Rottboellieæ and agrees with Euandropogoneæ in the entire sessile spikelet falling away with the joint, whereas in Rottboellieæ, gl I is removable and II and III persistent in the hollow of the joint. The Aromatic oil of Elionurus is contained in the glumes.

1. E. Royleanus, Nees ex A. Rich. Tent. Fl. Abyss. ii. 471; annual, dwarf, spikes corymbose each sheathed, gl I of sessile spikelet lanceolate narrowed into a 2-fid beak, margins with penicillate tubercles, III and IV epaleate. Hack. Monour. Androp. 343; Duthie Grass. N. W. Ind. 17, Fodd Grass. N. Ind. 28, t. 54. E. Grisebachii, Schmidt Beitr. Fl. Ins. Cap. Verd. 154. Rottboellia elegantissima, Hochst. & Steud. ex Steud. Nom. Ed. II. ii. 474. Andropogon elegantissimus & Grisebachii, Steud. Syn. Gram. 364, 365. Ratzeburgia Schimperi, Steud. Nom. l. c. 439.

VOL. VII.

UPPER GANGETIC PLAIN, Royle; Agra and Ettawah, Duthre; Delhi, Clarke.—

DI-TRIB. Arabia, Abyssinia, Cape Verd Islds.

Stems 4-12 in., slender, leafy, genicular

Stems 4-12 in., slender, leafy, geniculate. Leaves 4-10 in., narrow, flat or convolute, glabrous or spaisely harry, base fimbriate; lower sheaths terete, upper spathiform; ligule very short Spikes 1-2 in., erect, clustered towards the top of the stem, stout, green or purple, each enclosed in a long narrow flattened acute sheath; joints bearded below the tip. Sessile spikelets \(\frac{1}{4}\) in., erect; callus densely bearded; gl. I deeply 2-fid at the top, lobes linear cliate divergent, sides with a row of large tubercles each carrying a pencil of long hairs; II membranous, linear-lanceolate, acuminate, 1-nerved; III shorter, oblong, acute, nerveless, glabrous, epaleate; IV much shorter, oblong, obtuse, 1-nerved or nerveless. Pedicelled spikelets \(\frac{1}{2}\) in., narrowed almost from the base into a long subulate ciliate blade; II cymbiform, glabrous, narrowed into a scabrid awn; III and IV 0, pedicel with one margin shortly ciliate.

2. E. hirsutus, Munro ex Benth. in Journ. Linn. Soc. xix. (1881) 68; perennal, spikes peduncled naked, gl I of sessile spikelet narrowed into a long narrow flat 2-fid beak margins villous, gl. III and IV paleate. Boiss. Fl. Orient. v 466, Buthie Grass. N.W. Ind. 17, Food. Grass. N. Ind. 28, t. 17. Rottboellia hirsuta, Vahl Symb. i. 11; Del Fl. Egypt. t. 14, f. 1; Kunth Enum Pl i. 467; Hack. Monogr. Androp. 311. Ischemum hirsutum, Nees ex Steud Syn. Gram. 361. 1. masticatum, Trin. in Mem. Acad. Petersb. Ser VI. ii. (1833), 298. Coelorachis hirsuta, Brongn. in Duperr. Voy. Bot. 68 Lasiurus hirsutus, Boiss. Diagn. Fl. Or. II. iv. (1859) 146. Saccharum hirsutum, Forsk. Fl. Egypt. Arab 16.

NORTHERN PANJAB; Jelalpoor on the Jhelum, Jacquemont; Peshawur, alt. 3500 ft., Stewart. Rajpootana; Multan, Edgeworth; Sind, Stocks.—DISTRIB. Westward to N. Africa.

Rootstock woody, branched. Stems 1-2½ ft., ascending from a branching base, stout, smooth, rigid. Leaves narrow, coriaceous, sheaths white. Peduncle 6-10 in, slender. Spike solitary, stout, 2-4 in., silvery silky all over. Spikelets imbricating, appressed to the rachis; gl. I of lateral spikelet divergent, narrowly lanceolate, collaceous, 7-9-nerved; II ½ shorter, chartaceous, 5-nerved, aristately acuminate, awn scabild; III by alme, oblong, obtuse, faintly nerved, neuter, palea lanceolate, nerves scaberulous; IV oblong, obtuse, faintly 5-nerved, palea as of gl. III but smaller. Peducelled spikelet smaller, erect; gls. shorter, flowerless.—Regarded by Hackell as an anomalous Rottboellia, and nearer to Ischæmum than to Elionurus, but neither in habit nor characters does it approach the Rottboelliee; and is naturally, I think, an Elionurus, from other species of which it only differs in the paleate gls. III and IV.

# 51. CLEISTACHNE, Benth.

Tall perennial grasses. Leaves long, narrow, flat. Spikelets solitary, 1-fld., in an oblong contracted much branched panicle, linear-oblong, terete, hirsute, jointed on the branchlets of the panicle. Glumes 4, I and II narrow, rigidly coriaceous, obtuse, completely enveloping III and IV; III much smaller, narrow, hyaline, 2-nerved, margins inflexed ciliate; IV very short, hyaline, with a terminal stout twisted awn; palea minute, hyaline, ciliate. Lodicules cuneate, ciliate. Anthers 3, large, linear. Styles free, stigmas short. Grain obovate-oblong, compressed, free.—Species 3, the following and 2 African.

The affinities of this genus and of Germainia are with Anthistiria.

. **C. Stocksii**, *Hook. f.*; ligule oblong, spikelets dark brown, margins of gl. IV entire, palea ovate obtuse.

MALABAB; on the Bababoodan Hills, Stocks, Ritchie.

Stem tall, stout, simple. Leaves 12-.6 by \$\frac{1}{2}\$ in, finely acuminate, softly hairv, midrib stout, margins slightly thickened ciliolate; sheath torete; ligule coriaceous. Panicle 6-8 in., long-peduncled, suberect; rachis and branches sparsely ciliate, branchlets (pedicels of spikelets) strigose with bright yellow hairs. Spikelets \$\frac{1}{2}\$ in, crowded; callus short, bearded; gl. I dark brown, obscurely many-nerved, hirsute, shining; II like I but narrower, nearly glabrous; III 2-nerved, margins infolded, tip hispid; IV a twisted awn \$\frac{1}{2}\$-1 in. long, dilated at the base into a hyaline 3-nerved membrane embracing the minute palea.—Very closely allied to the African C. sorghoides, Benth., which differs in its very short ligule, golden yellow spikelets, usually 2-fid gl. IV, and transversely oblong ciliate palea.

## 52. GERMAINIA, Balans. & Portrass.

Rigid perennial grasses. Leaves narrow. Peduncles erect, bearing terminal narrowly oblong naked heads of 4 male spikelets, forming an involucriform whorl round a few long-awned females. Male spikelets sessile, 2-fld., glumes 4; I linear-oblong, very coriaceous, truncate, many-nerved, dorsally convex; II rather longer but much narrower, membranous, narrowly lanceolate, 3-nerved; III hyaline, narrowly lanceolate, 1-nerved, diandrous; its palea (if present) as long as itself; IV hyaline, lanceolate, diandrous; palea as long. Fem. spikelets much smaller than the male, cylindric, obliquely inserted on a pedicel by an obconical bearded callus; glumes 3, I chartaceous, linear, truncate, convolute round the others; II similar, but shorter; III the long twisted awn which is slightly dilated at the very base; palea short, very broad, tip erose. Lodicules 0. Anthers 2, very long Styles slender, stigmas long narrow. Grain closely wrapped in the glumes.—Species 3 or 4, Indian, African and Chinese.

1. **G. khasiana**, *Hack. in Œstr. Bot. Zeitschr.* xli. (1891) 50; leaves short linear-lanceolate quite glabrous, male spikelets sessile on the contracted tip of the peduncle, gl. I entire retuse or notched.

KHASIA HILLS; at Nurtiung and Poorung, alt. 4-4500 ft., Clarke.

Stems densely tufted, a foot high, erect, leafy, terminating in long slender peduncles Leaves 1-2 in., narrow, acuminate, coriaceous, 1-nerved; ligule hardly any. Heads \(\frac{1}{2}\)-\(\frac{2}{3}\) in. long. Gl. I of male fl. polished, tip ciliolate; gl. I of bisexual spikelet scaberulous, tip ciliolate; awn of III 2 in. long.—Very near G. capitata, Bal. & Poitr. of China, and probably only a form of that plant, which has rather larger heads and its gl. I has a semicircular retuse tip with a sharp tooth on each side.

2. **G. lanipes,** Hook. f.; leaves very long and narrowly linear sheaths at the base of the stem clothed with silvery wool, male spikelets superposed on a very short rachis.

TENASSERIM, Helfer.

I have examined very scanty material of this curious species, which differs from G. khasiana in the short stout rootstock with very thick roots, clothed for an inch or more with snowy wool, and radical leaves a ft. long by  $\frac{1}{2}$  in. broad.

# 52.1 COELARTHRON, Hook. f.

(Genus not in Clavis, p. 5.)

A very slender, straggling, nearly glabrous grass. Leaves small, elliptic, acute at both ends. Spikelets 1-fld., binate, a sessile bisexual and a minute often imperfect pedicelled, secund and imbricating on the fragile rachis of

a solitary erect spike; lowest pair on the spike imperfect; joints of rachis shorter than the sessile spikelet, clavate, tubular, tip truncate open, month entire compressed. Sessile spikelets dorsally flattened; callus very short, bearded; gl. I ovate-oblong, tip narrowly truncate, dorsally glabrous with a deep median channel, margins narrowly inflexed above broadly incurved below, keels subpectinately ciliate above the middle; II cymbiform, 1-nerved, awned; III oblong, 1-nerved; 1V very small, 2-fid, 3-nerved, awn slender, twisted; palea minute. Lodicules 2, cuneate-quadrate. Stamens 3. Styles 2. Grain fusiform. Pedicelled spikelets  $=\frac{1}{2}$ the sessile or less, male or neuter gls. 2-3, not awned; pedicel linear, flat.

A remarkable grass, differing from Andropogon in the secund spikelets, hollow joints of the rachis, deeply channelled gl. I of the sessile spikelet (as in Sect. Sehuna of Ischæmum), and the reduced pedicelled spikelets.

### C. Brandisii, Hook. f. in Hook. Ic. Plant. ined.

BURMA; high ground, generally with Teak, Brandis.

Stems very weak, branching, struggling, rooting at the nodes, white; with ascending filtform 1-2-leaved flowering branches. Leaves 1-2 by  $\frac{1}{6}-\frac{1}{4}$  in., inserted on the sheath by a mere point; acute or acuminate at both ends, membranous, flaccid, surfaces and margins quite smooth, midrib and nerves very slender; sheath glabrous; ligule oblong, obtuse. Spike 1-13 in, strict or incurved, quite white. Sessile spikelets \ in.; gl. I with a strong median keel on the ventral surface; II notched at the tip, awn as long as the gl. or shorter, very slender, recurved; III flat, ciliate; awn of IV 3 in., very slender, geniculate, column brown twisted, upper half very pale.

### 53. ANDROPOGON, Linn.

Grasses of various habit. Leaves usually narrow, base rarely rounded or cordate. Inflorescence of solitary binate digitate fascicled or panicled spikes (which are sometimes reduced to 3 spikelets), rachis articulate, usually fragile. Spikelets binate, a sessile fem. or bisexual, and a pedicelled male or neuter. Sessile spikelet 1-fld., glumes 4, I dorsally rarely laterally more or less compressed, margins inflexed or incurved, usually keeled; II as long as I, usually laterally compressed, awned or not; III hyaline, empty, 2-nerved or nerveless, epaleate; IV hyaline, broad or narrow, 2-fid and awned in the cleft or reduced to an awn more or less dilated at the base, paleate or not. Lodicules cuneate-quadrate. Stamens 3. Stigmas laterally exserted. Grain free. Pedicelled spikelets various, gls. 3-4, IV awnless.—Species about 200, chiefly tropical.

In this most difficult genus I have followed Hackel as closely as I could, not venturing to depart far from his grouping of the Indian species, to attempt which with any prospect of success would demand a revision of the whole genus. Hackel's two principal groups (Series), Isozyge and Heterozygi, unfortunately separate widely subgenera of close affinity in habit and in all other characters, except that adopted to distinguish between these groups. Thus the first two or even 4 subgenera of Isozygi are closely related to Cymbopogon amongst Heterozygi, and not to those that immediately follow them in the series Added to this, on the one hand the characters drawn from the form, sexuality, &c., of the lower sessile spikelets of the Heterozygi as distinguishing them from those of Isozygi are often variable and very difficult of detection; and on the other hand the same characters do occur here and there in several subgenera of the latter group. With regard to Hackel's subgenera, they appear to me to be on the whole well constructed and natural, though often depending on characters, some inconstant, others difficult of detection or appreciation. Of the best defined I should, following older authors, have preferred to have treated

them as genera, especially Chrysopogon, Cymbopogon and Heteropogon; and his section Pseudanthistiria of subgen. Hypoginium, should certainly rank as a genus closely allied to Anthistiria. - The following is Hackel's grouping :-

Series I Isozygi. Sessile spikelets of all the pairs alike in sex and form

throughout the spikes.

\* Peduncle of spikes enclosed in spathiform leaf-sheaths.

+ Joints of rachis and pedicels of upper spikelets clavate or trumpet-shaped, top cupular with toothed margins.

§ Spikes solitary on the peduncle. Pedicelled spikelets smaller than the sessile 1. SCHIZACHYBIUM. Peduncled spikelets larger than the sessile . 2. DIRCTOMIS §§ Spikes 2 or more on the peduncle. 3. ARTHROLOPHIS. ++ Joints of rachis and pedicels of upper spikelets slender, top obliquely truncate cupped or not . 4. HYPOGYNIUM. \*\* Peduncles of spikes not enclosed in spathiform leafsheaths; joints of rachis slender. Joints of rachis and pedicels of upper spikelets linear compressed with usually a central translucent channel and thickened margins

Joints of rachis very few, filiform, opaque; lodicules ciliate; grain dorsally compressed

Joints of rachis many, stout or slender, opaque . Joints of rachis few; spikes articulate on the obliquely

truncate bearded tips of the branches of the panicle 8. CHRYSOPOGON. Series B. HETEROZYGI. Lowest one or more sessile spikelets differing from all those above it in sex or form.

Spikes many (rarely 1 or few) on the pedancle digitate, sessile spikelets dorsally compressed

Spikes binate on the peduncle which is enclosed in a spathiform sheath; sessile spikelet dorsally compressed .

Spikes solitary, lower pairs of spikelets very unlike the upper; upper sessile spikelets cylindric

cleft. Pedicelled spikelets usually small, imperfect and withering.

5. AMPHILOPHIS.

6. Sorghum.

7. VETIVERIA.

9. DICHANTHIUM.

10. CYMBOPOGON.

11. HETEROPOGON.

Subgen. I. Schizachyrium, Benth. Spikes solitary; peduncle in a spathiform leaf-sheath; joints and pedicels clavate or bucciniform, mouths broad cupular irregularly toothed. Sessile spikelets dorsally compressed, callus short; gl. I keeled; II not awned; IV hyaline, 2-fid, awned in the

# \* Annuals.

1. A. brevifolius, Sw. Prodr. Veg. Ind. Occ. 26, Fl. Ind. Occ. i. 209; glabrous, stems slender straggling much branched leafy, leaves divaricate linear obtuse or subacute, spathes very narrowly linear spreading, spikes glabrous or sparsely hairy. Kunth Revis. Gram. ii. 563, t 196, Enum. Pl. i. 488, Suppl. 399; Steud. Syn Gram. 366; Hack. Monogr. Androp. 363; & in Mart. Fl. Bras. 11. III. 302; Benth. Fl. Hongk. 423; Duthie Grass. N.W. Ind. 19, Fodd. Grass. N. Ind. 34; Griseb. Fl. Brit. W. Ind. 538. A. debilis, Kunth l.c. A. flaccidus, A. Rich. Tent Fl. Abyss in 452. A. floridus, Trin. in Mem. Acad. Petersb. Ser. VI. 11. (1833) 265. A. fragilis, Br. Prodr. 202; Kunth Enum. l.c. A. obtusitolius. Poir. Encycl Suppl i. 583. A parviflorus, Roxb. Fl. Ind. i. 274. A. tenellus, Presl Rel. Hænk. i. 335. Pollinia fragilis & brevifolia, Spreng, Syst. i. 288, 289. P. vaginata, Spreng. Pugill. ii. 11. Schizachyrium, brevifolium, Nees Agrost. Bras. 332.—Andropogon, Wall. Cat. n. 8824-5-Batratherum. Wall. l.c. n. 8827.

TROPICAL HIMALAYA, from Kumuon to Sikkim, BEHAR, CENTRAL INDIA.

CHITTAGONG, BURMA, the NICOBAR ISLDS, and the MALAY PENINSULA.—DISTRIB.

Tropies.

Stems 8-24 m., very many from the root, filiform, flaccid, geniculate, leafy throughout. Leaves 1-3 in., 1-1 in. broad, flat, glabrous, margins and nerves beneath scabrid. Spikes numerous; peduncle capillary, spathes 1-12 in., flat; joints 5-10 as long as the sessile spikelet, and pedicels clavate, tips 2-toothed. Sessile spikelets in., linear-oblong; gl. I coraceous, tip 2-fid; awn 1/3-1 in. Pedicelled spikelet reduced to a long-awned glume.

2. A. axilis, Hochst in Flora, xxvii. (1844) 241; slender, erect, fastigiately branched above, leaves very narrow acuminate, spathe erect narrowly lanceolate, spikes silkily villous. Hack. Monogr. Androp. 365. A. fragillimus, Steud. Syn Gram. 384. A fragilissimus, Hochst. in Schimp. Pl. Abyss. n. 2057. A. Petitianus, A. Rich. Tent. Fl. Abyss. n.

BENGAL, Chota Nagpore, and the Central Provinces, Clarke, Duthre, &c .-

DISIRIB. Afric. trop.

Stems short stout and densely tufted, or lax erect and 12-18 in. high, leafy. Leaves 1-3 m., erect, glabrous or sparsely hairy. Spathes 1-11 in., slender; peduncles 4-1 in., compressed. Spikes very slender; joints 8-12, about 4 in. long, silkily ciliate, and pedicels thickened upwards, tips lunate. Sessile spikelets as long as the joints, subulate lanceolate; gl. I cornaceous, dorsally silkily villous, tip very slender bifid; II lucar-lanceolate, 1-nerved, tip with a short bristle; IV bifid; awn  $\frac{1}{3}$ - $\frac{2}{3}$  in, very slender. Pedicelled spikelet subulate, silky; gl. I shortly awned, whole plant reddish when dry.

### \*\* Perennials.

3. A. impressus, Hack. in Estr. Bot. Zeit. xli. (1891) 49; very slender, sparingly branched, leaves very narrow, joints of spikes 3-5 and pedicels very stout densely ciliate, gl. I of sessile spikelets glabrous lanceolate acuminate, deeply impressed between the scaberulous keels.

N.W. HIMALAYA; Kishtwar, Clarke, alt 4000 ft.

Perennial. Stems erect, flowering branches distant. Leaves 4-8 in., setaceously acuminate; sheath short, smooth; ligule rounded. Spathes slender. Spike about 1 in., scarcely exserted; peduncle glabrous; joints and pedicels subclavate, shorter than the sessile spikelets, densely ciliate, tops obliquely cupped. Sessile spikelets 1 in., linear-lanceolate, greenish, callus nearly glabrous; gl. I chartaceous, glabrous, tip 2-toothed, margins rather broadly inflexed; II lanceolate, acute, keeled, 3-nerved scabrid above; III oblong, obtuse, nerveless, ciliolate; IV oblong, cleft to below the middle, lobes glabrous; awn 1-3 in., very slender, pale. Pedicelled spikelets very narrow, gl. I linear-lanceolate, acuminate, purplish, 9-11-nerved; II 3-nerved, acute; III 2-nerved, obtuse; IV 0.—Near A Alopecurus, Hack. (of the Mauritius), which differs in the many-jointed spikes, in the 6-7-nerved gl. I which is more deeply channelled in the middle. The habit is that of a Cymbopogon.

4. A. bootanensis, Hook f: tall, stout, leaves very long, joints of spike few and pedicels long-ciliate, gl. I of sessile spikelets glabious linear-oblong truncate dorsally convex keels obscurely winged above.

BHOTAN HIMALAYA; Tassangsee, alt. 5-6000 ft., Griffith.

Perennial. Leaves 2-3 ft. narrowly linear, coriaceous, and sheaths smooth and glabrous. Spike 1-3 in., peduncle subexserted from the very narrow spathe; joints and peduncles half as long as the sessile spikelet, rather slender, tips toothed. Spikelets red-brown, ; in.; callus bearded; gl. I nerves obscure, II cornaceous, acute, 1-nerved; III linear-oblong, ciliate, nerveless; IV short, lobes ciliate; awn very slender short; palea minute, ovate. Pedicelled spikelet like the sessile. - I

have seen but one specimen, it is allied to A. *impressus*, but is a much stouter plant, 3-4 ft. high.

5. A. hirtiflorus, Kunth Revis. Gram. ii. 569, t. 198, Enum. Pl. i. 489; erect, stiff, leaves linear rigid, spathes long-peduncled, spike 2-5 inglabrous or nearly so, sessile spikelets \( \frac{1}{4} - \frac{1}{3} \) in. narrowly lanceolate. A. Pseudograyia, Steud. Syn. Gram 365; Hack. Monogr. Androp. 370. A. zeylanicus, Arn. ex Benth Fl. Hongk. 423; Thw. Enum. Pl. Zeyl. 368; Trim. Cat. Ceyl. Pl. 107. A. semiberbis, Kunth Enum. l. c. Rottboellia sanguinea, Retz. Obs. iii. 25. PPollinia fulta, Desv. Opusc. 69, Hack. l. c. 392. Thelepogon sanguineus, Spreng. Syst. i. 299. Schizachyrium zeylanicum, Arn. l. c. S. hirtiflorum and semiberbe, Nees. Fl. Afr. Austr. 334, 336.

Khasia Hills, alt. 4-5000 ft, J.D H. & T.T., Clarke. Burma, Kurz. Central Provinces, alt. 3-4000 ft. Ceylon.—Distrib. Tonkin, China, Mada-

gascar, Trop. and S. Africa and America.

Perennial. Stems tufted, 1-4 ft., simple or sparingly branched upwards, as thick as a crow-quill or less, smooth, shining. Leaves chiefly radical, 2-6 in by  $\frac{1}{3-\frac{1}{6}}$  in, obtuse acute or acuminate; sheath compressed. Spathes 1-2 in, linear-lanceolate, acuminate. Spake stout, very narrow, subterete; rachis stout, shining, joints shorter than the sessile spikelets, outer or both margins chlolate, tip hollowed strongly toothed Sessile spikelets \( \frac{1}{2} \) in., very narrow, half sunk in the concave faces of the joints; gl. I narrowly lanceolate, bicuspidate, dorsally rounded, faintly 5-nerved; II lanceolate, acuminate, with a gibbous base, and a narrow ciliate dorsal wing above the middle; III linear-oblong, acute, fimbriate, IV lobes nairow, acuminate, awn about \( \frac{1}{2} \) in. Pedicelled spikelets, gl. I flat, subulate, awned, margins inflexed; II short, oblong.—Dr. Stapf has identified the Indian A. Pseudogi ayia with its American and African species cited above, of which I have not given all the synonyms, which will be found in Hackel's Monograph.

Subgen. II. Discromis, Hack. Spikes solitary; peduncle in the axil of a spathiform leaf-sheath, joints and pedicels bucciniform, mouths toothed. Sessile spikelets laterally compressed, callus short; gl. I accumbent, keeled, II much broader long-awned; IV 2-toothed, awned in the sinus. Pedicelled spikelet twice as long and broad as the sessile and concealing it.

6. A. fastigiatus, Sw. Prodr. Veg. Ind Occ. 26, Fl. Ind. Occ. i. 207; Hack. Monogr. Androp. 393; Griseb. Fl. Brit W. Ind. 559. A. diatherus, Hochst. in Schimp. Pl. Abyss. n. 2013 (non Steud.). A. Hochstetteri. Steud. Syn. Gram 384. Diectomis fastigiati, H. B. & K. Nov. Gen. & Sp. 1. t. 64 (excl. Syn. Beauv.); Kunth in Mem. Mus. Par. ii (1815) 69; Nees Agrost. Bras. 340 (non Beauv.); Hack. in Mart. Fl. Bras. ii. II. 303. Pollinia fastigiata, Spreng. Puyill. ii. 13. Heteropogon Hochstetteri, Anderss. in Schweinf. Beitr. Fl. Æthiop. 310.

BERAE; near Gya and Chota Nagpore, Clarks, Duthre. TENASSERIM, Helfer. —DISTRIB. Tonkin, Chiua, Afr. and Amer. trop.

Perennial. Stem erect 6 in. to 8 ft., or decumbent below and fastigiately branched upwards, leafy. Leaves 3-12 in., narrowly linear, acuminate, scabrid; ligule elongate, acute. Spathes 2-3 in., linear-lanceolate, often very slender; peduncle variable, tip cupular. Spakes solitary, 1-2 in., fragile, joints much shorter than the spikelets, villous with white hairs, tip broad strongly toothed. Sessile spikelet \(\frac{1}{2}\)-\frac{1}{2}\) in., oblong; callus hairs = \(\frac{1}{2}\) the spikelets; gl. I linear-lanceolate, bicuspidate and keeled, margins thickened, ciliate towards the top; II shorter, cymbiform, 2-fid, awned between the short obtuse lobes, dorsally keeled and ciliate above, awn much longer than the spikelets; III linear-oblong, margins ciliate; IV cymbiform, 2-toothed, with a stout dorsal awn from below the tip; palea minute, hyaline. Pedicelled

spilelets neuter; gl. I ovate-lanceolate, twisted, acuminate, 2 cuspidate and awned, ciliate, green, many-nerved; II much smaller, thin, acuminate, awned, III still smaller, oblong, hyaline. - I have examined spikelets of the type of Homeatherum chinense, Nees in Hook & Arn. Bot. Beech. Voy. 239, which is certainly not Androp. apricus, as supposed by Hackel, but very close to A. fustigiatus, if not the same.

Subgen. III. Hypogynium, Hack. Spikes solitary, peduncled in the axil of a spathiform leaf-sheath; joints and pedicels slender, tops obliquely truncate. Sessile spikelets dorsally compressed; gl. I with inflexed or involute keeled margins; II kerled, awnless; III hyaline or 0, IV a simple awn (in the Indian species). Pedicelled spikelets like the sessile.

Hackel's section Pseudanthistina forms one of the most distinct genera of Andropagoneæ, with characters of inflorescence and spikelets totally at variance with his characters of Hypogynium. He however observes its affinity with Anthistima, near to which genus I place it.

7. A. foveolatus, Del. Fl. Egypt. 16a, t. 8, f. 2; densely tufted, basal sheaths silkily villous, spikes 3-6 elongate erect. gl. I of sessile spikelet smooth with usually a deep dorsal pit. Kunth Enum. Pl. i. 490; Hack. Monogr. Androp 402; Duthie Grass. N.W. Ind. 20, Fodd. Grass. N. Ind. 34, t. 21; Aitchis. Cat. Panyab. Pl. 176. A. strictus, Roxb. Fl. Ind. i. 260. A. Orthos, Schult Mant 11. 455. A. monostachyus, Spreng. Pugill. ii. 9 A. ramosus. Heyne ex Wall. Cat. n. 8802.—Andropogon, Wall. Cat. 8802.

Drier parts of INDIA, from the Panjab and Sind to Bengal, CHOTA NAGPORE, CENTRAL PROVINCES, CIRCARS and COROMANDEL .- DISTRIB. Westwards to the Cape de Veid Islds.

Stem 1-2 ft, simple or subfastigiately branched above, as thick as a sparrow's quill; nodes sparingly bearded. Leaves very narrow, sometimes almost filiform, rigid, scaberulous beneath, sheaths shorter than the internodes, scabrous or glabrous; ligule short, truncate, hyaline, ciliolate. Spikes 1-11 in.; peduncles capillary, erect, usually far exserted beyond the very slender spathe; joints and pedicels slender, villous. Sessile and pedicelled spikelets subequal \( \frac{1}{2} - \frac{1}{2} \) in, linear-oblong, subscute, purplish, glabrous except the shortly villous callus, shining; gl. I flat, 4-7-nerved, keels scabrid; II as long, 3-nerved, acute; III much shorter, glabrous, nerveless; IV awn 1-3 in. long, very faintly margined towards the base. Pedicelled spikelet rufous or purplish, neuter; gls. 2, I subacute, dorsally pitted or not, keels scabrid, 5-nerved, glabrous; II linear-lanceolate, acute, 3-nerved.

8. A. tuberculatus, Hack. Monogr. Androp. 404; tall, stout, basal sheaths glabrous, spikes solitary long-peduncled erect, gl. I of sessile spikelet lanceolate keels and nerves tubercled not pitted.

CENTRAL PROVINCES; in the Khandua and Betul districts, Duthie; Asinagarh, Kuntze.

Stem 4-6 ft., stout, stiff, pale yellow, shining, paniculately branched, nodes glabrous. Leaves 1-2 ft. by 1 in., rather rigid, glaucous, strongly closely nerved, setaceously acuminate, base narrowed, scabrid, midrib very broad; sheath quite smooth; ligule large, membranous, auricled. Spikes 1-12 in. Panicle leafy; spathes very narrow, scabrid with tubercle-based hairs; peduncle 2-4 in, strict, scabrid; joints and pedicels very slender, ciliate with long hairs Sessile spikelets } in., linear-lanceolate, callus shortly bearded; gl. I lanceolate, tip narrowly truncate, dorsally flat, 3-7-nerved, margins narrowly inflexed, keels and nerves tuberculate; II membranous, lanceolate, acute, 1-nerved, chiate; III linear, acute,

glabrous; IV awn  $\frac{1}{2}$ - $\frac{2}{3}$  in. Pedicelled spikelets male, gl. I strongly nerved; IV 0.— A very handsome grass.

Subgen. IV. ARTHROLOPHIS. Spikes 2-nate digitate or subpaniculate, on a common peduncle arising from a spathiform sheath; joints few or many, clavate or bucciniform (slender in A. tristis), tips cupular with toothed margins. Sessile spikelets dorsally compressed; gl. I not awned, margins inflexed, keeled; 11 dorsally keeled, awned or not; III hyaline; IV small, 2-fid with an interposed awn, or reduced to a simple awn. Pedvelled spikelets usually unlike the sessile; gl. I awned or not.—A heterogeneous assemblage.

- \* Joints of spikes and pedicels of upper spikelets rather slender; gl. II of sessile spikelet not awned.
- 9. A. tristis, Nees ex Hack. Monogr. Androp. 439; spikes 3-6 ununequal stipitate or subsessile on the peduncle, gl. I of sessile spikelet lanceolate deeply depressed between the thickened sides, IV very narrow 2-fid.

TEMPERATE WESTERN HIMALAYA, alt. 8-1000 ft., from Kashmir to Garwhal. Stems 2-3 ft., compressed, tufted on a stout short or creeping rootstock, slender or rather stout, erect or geniculate below, branching above; nodes glabrous. Leaves 6-10 by \(\frac{1}{4}\)-\frac{1}{2}\) in., nairowly linear, scaberulous, rather rigid, hairy at the base; lower sheaths bload, compressed; ligule oblong, membranous. Spikes 1-3 in., livid green; peduncle 2-6 in., spathe very nairow; joints and pedicels = \(\frac{1}{4}\) the sessile spikelet, hardly clavate, shortly ciliate. Spikelets loosely imbricate, sessile \(\frac{1}{4}\) in., very narrow; callus hairs very short; gl. I more or less scaberulous margins broadly inflexed; II narrowly oblong, apiculate, ciliate, keel subscaberulous; III lanceolate, 2-neived, ciliate; IV awn short or 0; palea minute, quadrate. Pedwelled spikelets as long as the sessile, gl I 3-7-nerved; II 1-5-nerved; III hyaline; IV 2-fid and mucronate or 0, paleate or not

- \*\* Joints of spikes and pedicels of upper spikelets clavate or bucciniform.
  - † Gl. II of sessile spikelets awned.
- 10. A. apricus, Trin. in Mem. Acad. Petersb Ser. VI. iv. (1836) 83; tall, slender, leaves very narrow, spikes 2-5 hispidulous, joints and pedicels bucciniform, gl. I of sessile spikelets linear 2-cuspidate or 2-aristulate, II long-awned, IV bifid awned between the ciliate lobes. Hack. in Mart. Fl. Bras. ii. II 304. A. apricus var. indicus, Hack. Monogr. Androp. 457. A. ascinodis, Clarke in Journ. Linn. Soc. xxv. (1889) 87, t. 36.

KHASIA HILLS, alt. 2-3500 ft., J D H & T. T. (Herb. Ind. Or. Androp. n. 4).
MUNNEPORE; on Jackpho, alt. 7500 ft., Clarke. PEGU; in the Eng forest, Kurz.—

DISTRIB. Trop. Africa and America.

Stem 3-5 ft., strict, sparingly branched upwards, quite smooth, nodes glabrous. Leaves 1-3 ft. by  $\frac{1}{3} - \frac{1}{6}$  in., erect, conaceous, glabrous except a few hairs at the base; sheaths very long, narrow, upper spathiform, very slender, tips setaceous, lower open; ligule oblong, obtuse, chartaceous. Inforescence subpanieled; peduucle 2-4 m, filiform, puberulous, sheathed almost up to the spikes. Spikes  $\frac{1}{2}$ -1 in., very unequal in each fascicle, very shortly stipitate, hairs or cilia rigid setiform brownish, joints and pedicels half as long and as broad as the sessile spikelets, cuneately campanulate, base narrow, dorsally rounded, glabrous or scaberulous, sides ciliate with long hairs. Sessile spikelets  $\frac{1}{6}$ - $\frac{1}{6}$  in.; callus conical, rigidly bearded; gl. I deeply channelled dorsally, keels scabrid above the middle, thickened below, nerves 2-nate at the keels; II 1-nerved, margins ciliate, keel setulose at the top, tip 2-fid, awn as long as itself; III linear, hyaline, broadly ciliate; IV shorter, oblong, 1-nerved;

awn I in, slender; palea small, linear-oblong, culate. Peducelled spikelets narrower and rather smaller than the sessile, purplish; gl. I ovate-lanceolate, 2-cuspidate, keels long culate above the middle; II and III as in the sessile spikelet.—According to Hackel the Indian plant differs from the African in the longer hars of the joints and pedicels and in the more exserted peduncle of the spikes, but I find that these and other minute characters are very inconstant. Homcatherum chinense, Nees, included under A. apricus, is, I think, certainly A. fastigiatus.

11. A. longipes, Hack. in Flora (1885) 138; annual, stem slender ascending, leaves linear and sheaths sparsely hirsute, spikes 2 both stipitate, peduncle naked (spathe 0), joints many and pedicels rather stout subclavate tips cupped shortly chiate, sessile spikelets  $\frac{1}{3}$  in. dorsally compressed oblong-lanceolate, gl. I broadly unequally winged above the middle aristulate, II long-awned, IV obovate cleft to the middle, awned between the lobes.

NILGHIRI HILLS, Perrottet.

Stems 12-16 in., decumbent below, nodes glabrous. Leaves 4-6 by  $\frac{1}{3-6}$  in, hairs tubercle-based; ligule very short. Spiles 2-3 in., rather stout, densedth, green; joints and pedicels =  $\frac{1}{2}$  the sessile spikelet, concavo-convex, margins rounded. Spilelets imbricating, callus short, obtuse, bearded, gl. I dorsully sparsely hairy and depressed or convex, many-nerved, wing produced beyond the summit servulate; II ciliate, 3-nerved, lateral nerves submarginal, tip 2-toothed, keel scaberulous, awn as long as the gl.; III hyaline, 2-nerved, copiously ciliate, IV as long as III; lobes lanceolate, acuminate; awn  $\frac{\pi}{2}$  in, glabrous. Pedicelled spikelets as long as the sessile, male; gl. I shortly awned, 6-7-nerved; II membranous, 3-nerved; III and IV linear-oblong, ciliate.—I have seen only one specimen. This, I think, is a doubtful member of the subgenus, the peduncle not arising from a distinct flattened spathe.

†† Glume II of sessile spikelets not awned.

12. A. pumilus, Roxb. Fl. Ind. i. 273; stem paniculately branched, leaves narrow, spikes in pairs, joints and pedicels clavate or trumpet-shaped, sessile spikelets dorsally compressed, gl. I very narrow lanceolate deeply channelled between the thickened keels, IV very narrow bisetose. Kunth Enum Pl. i. 492; Steud. Syn. Gram. 388. A. demissus, Steud. l. c. A. geminatus, Herb. Russ. ex Wall. Cat. n. 8798 C. A. humilis, Wight Cat n. 1701. A. caesius a, Nees ex Wight l. c. n. 1700. A. hirtus, Heyne in Herb. Roth. A. pachyarthrus, Hack. Monogr. Androp. 449; Duthie Grass. N.W. Ind. 21, Fodd. Grass. N. Ind. t. 39.—Andropogon, Wall. Cat. n. 8798, A. B. C., 8799.

Drier parts of India. Nepal, Wallich, &c.; from Banda in Rajpootana, and Surat to the Central Provinces and Coromandel.

Annual or perennial? Stem 6-18 in high, slender, suberect or geniculate and decumbent below; nodes glabrous. Leaves 3-5 in, rarely \( \frac{1}{6} \) in. broad, sometimes almost filiform, acuminate, glabrous; sheath compressed, keeled; ligule short, truncate. Spikes \( \frac{1}{2} \) in, in pairs terminating a very slender peduncle which arises from a narrow flattened glabrous spathe \( \frac{1}{2} \) in. long; joints 6-8 and pedicels shortly ciliate on one margin, tops dilated cupped with 2-3-toothed margins. Sessile spikelets \( \frac{1}{2} \) in; callus glabrous; gl. I membranous, acuminate, bicuspidate, lateral ribs often ending below in 2 tubercles; II as long, narrowly lanceolate, mucronate, coriaceous; III shorter, linear, hyaline, 2-nerved; IV very narrow, cleft into two capillary-lobes with an interposed capillary awn \( \frac{1}{6} \) in. long; palea minute, oblong. Pedicelled spikelets \( \frac{1}{2} \) in., ovate-lanceolate, acuminate, 5-nerved; gls 3.—An excellent figure amongst Roxburgh's drawings attests Hackel's A. pachyarithrus being A. pumilus. The pedaucle of the spike is sometimes 2 in. long. Wallich's n. 8799 is very tall and slender, as if drawn up amongst other plants.

13. A. Munroi, Clarke in Journ. Linn. Soc. xxv. (1889) 87, t. 37 (chur. reform.); tall, slender, leaves very narrow, spikes in a small open subsimple panicle terminating solitary capillary sheathed peduncles, joints and pedicels clavate shortly silkily ciliate, sessile spikelets lanceolate, gl. I acuminate deeply hollowed between the thickened keels, IV very narrow bisetose.

NORTH MUNNEPORE, alt. 3500 ft., Clarke.

Stem 2-3 ft., spaningly branched upwards, slightly compressed, nodes glabrous. Leaves 6-10 by  $\frac{1}{10}$  in., rather corraceous, smooth, glabrous, nerves close-set, glaucous beneath with prominent midrib, sheath terete, smooth keeled; ligule rather long. Spathe 1-2½ in., very slender, terete, acuminate. Panicle 1-1½ in, as broad as long, of few irregular spieading branches Spikes 4-8, 1-3 in. long, very shortly stipitate, solitary or 2-3-nate, divaricate or drooping, peduncle and pedicels of spikes smooth, glabrous; joints and pedicels of upper spikelets with irregularly toothed cupular tips; lowest pair of spikelets sometimes imperfect or male. Spikelets 4-6 pairs, in. long, laxly imbricating; sessile, callus shortly softly bearded; gl. I coriaceous, glabrous, shining, margins incurved, keels minutely scaberulous, nerves 0, or one vanishing below the middle; II acuminate, 3-nerved, keel ciliolate above the middle; III hyaline, ovate-oblong, 2-nerved, glabrous; IV as long as III, lobes subulate, awn 1-2 in., capillary; palea minute, truncate Pedicelled spikelets male, gl. I linear-oblong, convex, subacute, 7-9-nerved; III acuminate, 3-nerved, glabrous; Ill as in the sessile spikelets; IV lanceolate.—The figure in Journ. Linn. Soc. gives the habit of the plant, but the description and analysis are very wrong. The former also errs in citing Androp. No. 4, Herb. Ind. or Hf. & T. under A. Munroi, it is A. apricus.

Subgen. V. AMPHILOPHIS, Trin. Spikes 2 or more fascicled or panicled, with many or few joints; joints and pedicels of upper spikelets narrow, linear, flattened, usually channelled and translucent between the thickened sides along the mesial line, terete and opaque in 21. A. concarensis, 27. fascicularis, and 28. venustus, tips simply truncate. Sessile spikelets dorsally compressed; callus short; gl. I acutely 2-keeled; II keeled, awnless; III hyaline, epaleate; IV an awn with the base acute or very rarely dilated and 2-toothed or 2-fid. Pedicelled spikelets usually as long as the sessile, but narrower, many-nerved, and male.

- A. Spikes with many pairs of spikelets.
- \* Pedicels of upper spikelets and joints of rachis slender, strongly compressed, with thickened margins and translucent centre.
- † Spikes digitate or fascicled, not panicled, lower longer than the rachis of the inflorescence. (See also 24. A. intermedius.)
- $\S$  Glume I of sessile spikelets more or less villous below the middle. (See also 19. A. pertusus.)
- 14. A. Ischæmum, Linn. Sp. Pl. 1047; leaves narrowly linear, sheaths compressed, spikes 3-20 slender silky rachis glabrous, sessile spikelets \( \frac{1}{8} \frac{1}{6} \) in., callus shortly bearded, gl. I oblong minutely truncate not pitted 5-7-nerved more or less appressedly hairy below the middle, keels rigidly ciliate. Kunth Enum. Pl. 1. 499; Host Gram Austr. ii. 3, t. 3; Reichb. Ic. Fl. Germ. t. 54; Nees Gen. Fl. Germ. Monocot. i. t. 92; Steud. Sym. Gram. 379; Hack. Monogr. Androp. 474; Aitchis. Cat. Panjab Pl. 176; Duthie Grass. N.W. Ind. 20, Fodd. Grass. N. Ind. 35, t. 23; Benth. Fl. Austral. vii. 531. A. angustifolius, Sibth. & Sm. Prodr. Fl. Grac. 1. 47. A. annulatus, F. Schmidt Fl. Cap. Verd. 157. A. radicans,

Lehm. Ind. Sem. Hort. Hamb. 1828; Nees Fl. Afr. Austr. 106. A. villosus, a, Lamk. Fl. Fr. iii. 364.

NORTH WEST INDIA, from Kashmir and West Tibet to Kunawur, ascending to 12,000 ft. - DISTRIB. Westward to S. Europe, and tropics generally or sporadi-

cally. Stems 2-3 ft., erect or geniculately ascending, subsimple, naked above; nodes naked or shortly bearded. Leaves 1-2 ft. by 1 1 1 in , glabrous or harry above, especially towards the base, glaucous, scaberulous above, base rounded; sheath loose; ligule very short Spikes unequal, 11-3 in., shortly stipitate, usually purplish. Sessile spikelets, gl. I dorsally flat; II lanceolate, mucronulate, keels scabrid above; III oblong-lanceolate, acute, ciliate; IV awn  $\frac{1}{2}$  in. Pedicelled spikelets usually darker than the sessile, male; gl. I lanceolate, 9-nerved, glabrous, keels ciliate above; II linear-lanceolate, 5-7-nerved; III linear-oblong, obtuse, ciliate; IV very narrow.

15. A. Pseudischæmum, Nees ex Steud. Syn. Gram. 380; tall, nodes bearded, leaves narrow pruinose beneath, sheaths terete, spikes 4-6 stipitate slender flexuous, rachis smooth, joints and pedicels a little shorter than the spikelets silky, sessile spikelets 1-1 in lanceolate, callus hairs very short, gl. I imperforate sparsely sakaly vallous below the middle 7-9-nerved, keels ciliate. Hack. Monogr. Androp. 477. A. annulatus & quinqueflorus, Heyne in Herb. Rottl. A. Ischæmum, Roxb. Fl. Ind. i. 264. A. oryzetorum, Hack. l.c. A. pentastachyus & undulatus, Heyne ex Wall. Cat. n. 8815 A. A. scandens, Thw. Enum. Pl. Zeyl. 368 (non Roxb.); Trim. Cat. Ceyl. Pl. 107.

The DECCAN PENINSULA, Heyne, &c. COROMANDEL, Roxburgh. CEYLON, Thwartes.

- Stem 2-3 ft., terete glabrous. Leaves 6-10 by 1-3 in., glabrous or fimbriate with long hairs towards the base, upper surface and margins scabrid, lower glaucously piuinose, lateral nerves prominent; upper margins of the sheath membranous; ligule very short, ovate, membranous. Spikes flexuous or erect, 2-4 in. long, dull green, subracemose, common rachis smooth, axils bearded, special peduncles 1-1 in.; joints and pedicels slender. Sessile spikelets \(\frac{1}{2}\)-\(\frac{1}{2}\) in.; gl. I minutely truncate, tip hyaline, keels closely ciliolate and with a few long marginal hairs; II ciliate. 3nerved; III hyaline, oblong, ciliate, 2-nerved or nerveless; IV awn \( \frac{1}{2} - \frac{3}{3} \) in., base obscurely dilated, palea O. Pedicelled spikelets longer than the sessile, lanceolate, gl. I 9-nerved, glabrous dorsally, keels scaberulous and ciliate; II 5-7-nerved; III ovate-oblong; IV minute or 0.—The spikelets vary a good deal in size. The pruinose undersurface of the leaves is a very marked character. Roxburgh's figure of his A. Ischæmum has awns an inch long, but allowance must be made for native artists' work. I have seen only a single specimen of A. oryzetorum, the spikes are very long and flexuous. Hackel distinguishes it from Pseudischæmum by the leaves being scabrous on both surfaces, which they are not in the specimen I have examined.
- 16. A. compressus, Hook. f.; stem tall robust compressed, nodes glabrous, leaves long broad flat, sheaths compressed keeled, spikes very many densely subcorymbosely panicled pale flexuous silky, joints and pedicels very slender, sessile spikelets 1 in. ovate-lanceolate, callus hairs = 1-1 the spikelet, gl. I imperforate 5-7-nerved villous below the middle, keels minutely scabrid.

The DECCAN, Lusboa (No. 6. A. odoratus), Woodrow.

Stem 3-4 ft., as thick as a goose-quill at the base, erect, sparingly branched. leafy. Leaves 1-11 ft. by 1-13 in., finely acuminate, slightly scaberulous on the margins and both surfaces, a little hairy towards the base; sheaths strongly compressed and acutely keeled, uppermost forming a lanceolate spathe 4-6 in long to the base of the panicle; ligule a ciliate membrane. Fuscicles of spikes 4-5 in. long,

erect, branches slender, lowermost  $\frac{1}{2}$  in. long, and rachis smooth. Spikes 1-2 inbranched at the base, firm, nearly white, callus-hairs  $\frac{1}{3}$  the length of the spikelet. Sessile spikelets, joints and pedicels about  $=\frac{1}{3}$  spikelet, centre hyaline, upper hairs reaching the top of the sessile spikelet; gl. I, thin, margin narrowly incurved, tip truncate, hyaline; II ovate, 1-nerved, tip hyaline; III shorter, ovate obtuse glabrous nerveless, IV awn about  $\frac{1}{3}$  in, inconspicuously margined below. Pedicelled spikelets narrower than the sessile, hairs of callus half their length; gl. I 9-11-nerved; II 3-nerved; III oblong, long-ciliate, nerveless.—Sent by Lisboa as A. odoratus, but apparently very different from the description of that plant and from the specimens received in the strongly compressed and acutely keeled sheaths, broad leaves and inflorescence.

17. **A. Woodrovii**, Hook f.; stems tall erect compressed, nodes glabrous, leaves long, sheaths compressed, spikes erect stipitate fascicled strict silky, joints and pedicels slender ciliate with long erect hairs, sessile spikelets  $\frac{1}{8} - \frac{1}{6}$  in. oblong-lanceolate, callus hairs  $= \frac{1}{4}$  of the spikelet, gl. I of sessile spikelet 8-12-nerved silky below the middle, tip truncate hyaline, keels ciliolate.

BOMBAY; Mawal, Woodrow (Herb. Bombay, n. 27).

Stems 3-4 ft., tuited on a woody rootstock, thicker than a goose-quill at the base and obtusely 2-edged, solid, stiff, branched above. Leaves 1-2 ft. by \(\frac{1}{2}\)-\frac{1}{2}\) in., rigid, surfaces and margins scaberulous, not pruinose beneath; sheath loose, keeled, quite smooth, ligule a truncate ciliate membrane. Spikes 3-5, \(\frac{1}{2}\)-1 in. long, pale, on slender but stiff smooth proper peduncles, \(\frac{1}{2}\)-\frac{1}{2}\) in. long; joints and pedicels linear, margins silky, upper hairs half as long as the spikelet. Sessile spikelets, callus rather long, obtuse; gl. I coriaceous, glabrous above the middle, margins narrowly incurved, nerves slender; II chartaceous, 3-nerved, ciliate; III ovate, acute, nerveless, glabrous; IV a simple awn \(\frac{1}{2}\)-\frac{2}{3}\) in. Pedicelled spikelets narrower than the sessile; gl. I 9-nerved, glabrous, keels scabrid; II 3-nerved, ciliate; III obovate, ciliate, nerveless; IV 0.—Apparently a very distinct species, of which better specimens are much wanted, the spikes being much broken. Mr. Woodrow observes that the odour is that of camphor

- $\S\S$  Glume I of sessile spikelets usually quite glabrous (or hairy below the middle in A. pertusus).
- 18. A. pertusus, Willd. Sp. Pl. iv. 922; erect or ascending, nodes more or less bearded, leaves linear, sheaths terete, spikes 3-7 usually purple 1-2 in. digitately fascicled shortly stipitate slender silky, rachis fragile, joints and pedicels silkily ciliate, sessile spikelets \(\frac{1}{7}\) \frac{1}{6} in. oblong-lanceolate minutely truncate usually shining glabrous or sparsely hairy below the middle 5-9-nerved usually 1-2-pitted dorsally callus shortly bearded, keels spinulosely ciliate above. Beauv. Agrost. 131, t. 23, f. 2; Br. Prodr. Fl. Austral. 201; Roxb. Fl Ind. i. 258; Kunth Enum. Pl. i. 498; Steud. Syn. Gram. 364; Hack. Monogr. Androp. 479; Wight Cat. n. 1696; Thw. Enum. Pl. Zeyl. 367 (excl. Syn.) 437, Trim. Cat. Ceyl Pl. 108; Aitchis. Cat Panjab. Pl. 176 (excl. Syn.), Duthie Grass. N.W. Ind. 21 (excl. Syn.), Fodd Grass. N. Ind. 38, t. 25; Issboa in Bomb. Journ. Nat. Hist. vi (1891), 202; Nees Fl Afr. Austr. 107; Benth. Fl. Austral. vii. 530; Buker Fl. Maurit. 445 (excl. some Syns.); Boiss. Fl. Orient. v. 464. A. angustifolius, Parl. Fl. Palerm. i. 269. A. panormitanus, Parl. Fl. Ital. i. 140. A. punctatus, Aitchis. in Journ Linn Soc. xviii. (1881) 111 (not of Roxb.). Lepeocercis pertusa, Hassk. Pl. Jav. Rar. 52. Eleonurus pertusus, Nees mss. ex Steud. l. c. Holcus pertusus, Linn. Mant. ii. 301.—Andropogon, Wall. Cat. n. 8804 A. B. C. D.

Drier parts of INDIA; from the Panjab to Burma, and southward to CEYLON .-

DISTRIB Westwards to Sicily; trop. Asia, Africa, and Australia

Very variable in habit and stature, rarely 12 in. high, tufted, annual or perennial; stem sometimes creeping and rooting, usually ascending from a leafy base, slender, even filiform; nodes sometimes densely bearded. Leaves 2-12 by  $\frac{1}{10}$  d in., acute or acuminate, glabrous except at the ciliate base, rarely harry, surfaces scaberulous, dull green; sheath hardly compressed, glabrous or villous; ligule short, membranous, truncate. Spikes pale or purplish; joints and pedicels very slender  $= \frac{1}{2}$  the sessile spikelet; gl. I of sessile spikelet subacute, coriaceous; II 1-3-nerved; III linearoblong, obtuse, glabrous, IV, awn 1-3 in., capillary, base slightly dilated; palea minute or 0. Peducelled spikelets like the sessile, male or neuter; gl I 7-13-nerved, glabrous, pitted or not, keels chiolate throughout their length; II lanceolate, 5nerved, ciliate; III linear-oblong, glabrous; IV short or 0 -Lisbon describes the spikelets as aromatic when crushed. Hackel has the following Indian varieties, all of which, except longifolius, are united by various intermediates.

a. genuinus; gl. I thin not shining more or less villous below the middle, spikes

3-9.—Common.

8. Wightn; sheaths villous, nodes long bearded, spikes about 15.—"Panyanasum," Wight Cat. n. 1696

e. longifolius; tall, erect, stout from a woody stock, 2-4 ft. high, nodes densely bearded, leaves 12-18 by 1 in. hairy, sheaths hirsute, lower spikes branched, spikelets quite glabrous, gl. I of lower spikelet coriaceous. A. Arnottianus, Nees in Wight Cat. n. 2338.—Andropogon, Wall. Cat. n. 8803.—Ceylon? Wight.—A very different looking plant from the other forms of A pertusus.

n. insculptus; sheaths glabrous, gl. I of sessile spikelets 1-2-pitted truncate,

keels longer ciliate. A. insculptus, A. Rich Tent. Fl. Abyss. ii. 458. A. bifoveolatus

& subunifoveolatus, Steud. Syn. Gram. 380.—Not uncommon.

19. A. Foulkesii, Hook. f.; stem erect or ascending very slender, nodes glabrous, leaves narrowly linear, sheaths terete, spikes 3-6 1-11 in. long digitately fascicled long-stipitate slender purplish, joints and pedicels shortly ciliate, sessile spikelets 1 in. oblong-lanceolate dorsally depressed in the middle line imperforate 7-nerved glabrous keels pectinately ciliate.

NILGHIRI HILLS, Wight; Kaity, Foulkes; Pykora, King.

Perennial. Stem 12-18 in. Leaves 6-10 by \(\frac{1}{6}\)-\frac{1}{4} in., finely acuminate, glabrous or hispid on both surfaces with spreading hairs, midrib very strong; sheath glabrous, mouth and ligule villous with long hairs. Spikes 1-1; in., special peduncles 1-1 in., very slender, axils bearded with long soft hairs; joints and pedicels slender, flat with thickened margins and diaphanous centre. Sessile spikelets 1-1 in, tip 2-toothed, callus bearded; gl. I dorsally flattened or convex, nerves obscure or distinct; II acuminate, 3-nerved, keel scaberulous above, margins ciliate; III shorter, lanceolate, nerveless; IV awn 1-2 in., capillary, palea O. Pedicelled spikelet longer and narrower than the sessile; gl. I strongly 9-nerved .- Resembles A. Ischæmum, differing in the much shorter hairs of the joints and pedicels and glabrous spikelets.

20. A. concanensis, Hook. f.; slender, erect, leafy, leaves very narrow sheaths terete, nodes glabrous, spikes 5-8 2-2 $\frac{1}{2}$  in. long loosely fascicled long-stipitate slender flexuous pale, joints and pedicels slender compressed not deeply sulcate sparsely shortly ciliate, spikelets 1 in. ovate- or oblong-lanceolate narrowly truncate glabrous 7-nerved keels very shortly ciliate.

Bombay, Woodrow (Herb. Bomb. n. 28).

Perenmal. Stems many from a nodose stock, 28-24 in., firm, smooth, terete, leafy. Leaves 8-10 by 12-18 in., finely acuminate, smooth on both surfaces; sheaths smooth; ligule a ridge. Spikes very pale, rachis and proper peduncles filiform, glabrous, the latter  $\frac{1}{2}$ - $\frac{2}{4}$  in. long, axils slightly bearded; joints and pedicels  $=\frac{1}{2}$  the lower spikelet, compressed, hardly grooved and not translucent in the centre, sides not thickened. Sessile spikelets small, callus hairs  $=\frac{1}{4}$  the gls.; gl. I thin, nerves very slender, keels culiate with stiff very short bristles; II lanceolate, acuminate, ciliate, nerves 3 faint; III much smaller, oblong, obtuse, nerveless; IV, awn  $\frac{1}{2}$  in., capillary, base slightly dilated. Pedicelled spikelets narrower than the sessile, gl. I 9-nerved; II and III as in the sessile; IV small, oblong, often unequally 2-fid, ciliate, nerveless.—Although the pedicels of the upper spikelets and joints of the rachis are not as in typical Amphilophis, this appears to be the position of A. concanensis.

21. A. Kuntzeanus, Hack. Monogr. Androp. 478, tall, nodes thickly bearded, leaves narrowly linear smooth, sheaths terete glabrous, spikes 12-15  $\frac{3}{4}-2$  in. long densely fascicled slender silky purplish, joints and pedicels plumosely ciliate with long hairs, sessile spikelets  $\frac{1}{5}$  in. linear-lanceolate, callus hairs  $=\frac{1}{2}$  the spikelets, gl. I pitted or not 7-9-nerved keels subpectinately ciliate towards the 2-toothed tip.

The CONCAN and CENTRAL PROVINCES, Kuntze, Duthie.

Stem 3-5 ft, as thick as a goose-quill below, with 2-3 slender flowering branches above, terete, smooth. Leaves 10 in. and upwards by \$\frac{1}{6}\$-\$\frac{1}{4}\$ in., glabrous, glaucous, smooth, margins scaberulous, upper cauline short, rigid. Spiles corymbose, slender, flexnous, proper peduncles \$\frac{1}{4}\$ in., slender, glabrous; joints and pedicels = \$\frac{1}{2}\$ the lower spikelet or more, translucent in the middle line. Sessile spikelets narrow; gl I quite glabrous, thin; II lanceolate, acuminate or mucronate, margins ciliolate; III lanceolate, glabrous; IV awn about \$\frac{1}{2}\$ in, base somewhat dilated. Pedwelled spikelets narrower than the sessile, male; gl. I strongly 9-11-nerved, keels ciliate scabrid at the entire tip, II 5-nerved; III ovate-oblong ciliate, nerveless; IV small, linear, or 0.

22. A. ensiformis, Hook. f.; stem erect stout compressed, nodes glabrous, leaves erect strict narrowly ensiform acuminate, sheath strongly compressed, spikes many in a thyrsiform fascicle shortly stipitate, joints and pedicels silky with long hairs, sessile spikelets  $\frac{1}{6}$  in. ovate-oblong, callus hairs  $=\frac{1}{2}$  the spikelet, gl. I membranous dorsally flat 5-7-nerved very sparsely silkily villous towards the base, tip truncate keels minutely ciliate.

The CONCAN? Dalzell.

Stems 2 tt. and upwards, densely tufted, base as thick as the thumb, with stout roots, clothed with the compressed equitant leaf-sheaths. Leaves 8-10 by \(\frac{1}{2}\) \(\frac{1}{2}\) in., rigid, strongly nerved, glabrous or sparsely hairy, tips acicular, margins and boths surfaces scaberulous; sheaths smooth, lower equitant; ligule short, scarious. Spakes \(\frac{1}{2}\) in., in an erect narrow thyrsus 3 in. long, pale purplish, proper pedunoles \(\frac{1}{2}\) in.; joints and pedicels very slender, flat with a translucent channel, ciliate with very long erect hairs. Sessile spikelets, callus small; gl. I thin, shining, margins rather narrowly incurved, keels slender; II ovate-oblong, acute, 3-nerved, ciliate, not keeled; III narrowly oblong, ciliate; IV a very narrow entire or 2-toothed membranous dilatation of the base of the slender awn, which is \(\frac{1}{2}\) in. long. Pedicelled spikelets as long as the sessile, linear-oblong; callus naked; gl. I convex, manynerved; II 5-nerved; III linear-oblong, ciliolate; IV 0.—I have seen only a single specimen from the Herbarium of the late Mr. A. Dalzell, with no locality marked. The straight sword-shaped leaves are remarkable.

- †† Spikes racemed or panicled, lower much shorter than the rachis of the inflorescence.
  - 23. A. intermedius, Br. Prodr. 20; inodorous, tall, leaves narrowly

linear, sheaths terete, rachis and branches of panicle glabrous, spikes fragile, joints and pedicels slender densely ciliate, sessile spikelets 1 in. oblong-lanceolate acute, callus hairs very short, gl. I of sessile spikelets glabrous or sparsely hairy or hispid below pitted or not, keels scabrid towards the tip. Kunth Enum. Pl. i. 500, Steud. Syn. Gram. 392, Hack. Monogr. Androp. 485; Lisboa in Bomb. Journ. Nat. Hist. iv. (1889), & vi. (1891) 69, 202. A. pertusus, Thw. Enum. Pl. Zeyl. 367 (in part). ? A. Pseudischæmum, Duthre Grass. N.W. Ind 21, Fodd. Grass. N. Ind. 88. A. fascicularis, Thw. l c. 437; Trim Cat. Ceyl Pl. 108; Benth. Fl. Austral. vii. 531. Holcus montanus, Herb. Ham. ex Wall. Cat. n. 8805 C .- Andropogon, Wall. Cat. n. 8804 E, 8805, 8806, 8815 C.

Throughout India, from the Panjab (ascending the Western Himalaya to 8000 ft ) to Bengal and Arracan and southward to CEYLON. - DISTRIB. Westward

to the Caucasus, China, Malaya, and the Pacific. Trop. Africa.

Perenmal. Stem 3-5 ft., stout or slender, slightly flattened on one side; nodes glabrous or hairy. Leaves 6-18 by  $\frac{1}{h} - \frac{1}{3}$  in., flat, glaucous, setaceously acuminate, ciliate towards the base; sheath hairy at the top; ligule very short, truncate. Panicle very variable in form and density, pyramidal thyrsiform or subcorymbose, rachis and branches glabrous the latter usually in opposite pairs; spikes variable in length. Spikelets pale green or purplish; gl. I rather thin, obtuse or narrowly truncate, 4-7-nerved; II oblong or lanceolate, 3-nerved, keel smooth, margins glabrous; III = \frac{1}{3} I, oblong, glabrous, nerveless; IV a slender awn, 1-1\frac{1}{6} in. long, palea 0.—Pedrcelled spikeleis linear-oblong or -lanceolate; gl. I 5-9-nerved, glabrous, keels ciliolate; II lanceolate, 3-nerved, ciliate; III shorter, oblong, glubrous, nerveless; IV 0 - A variable plant, nearest perhaps to a Kuntzeanus from which the paniculate inflorescence and smaller spikelets distinguish it. In some specimens the spikes are reduced to a few, and then the paniculate character disappears.

The following are Hackel's varieties of the Indian plant, which a larger series of specimens than he had access to tends to invalidate. -- Roxburgh's A. punctatus and A. glaber (Anatherum glabrum, Schult. Mant. ii. 446) of both which there are good original drawings, do not fall under any of Hackel's vars. Both have pitted gl I; A. glaber has few spikes on the branches of the panicle, A. punctatus has many long quite simple spikes on a rather short rachis. Hackel has given a plant of Duthie's from Simla, 7-8000 ft., the mss. name of var. himalayensis; it is, I think,

referable to var. caucasicus.

Var. genuinus; panicle 4-5 in. subsimple, branches with one or few spikes, gl. I not pitted appressedly hairy below, keels rigidly ciliolate. A. Vachelii, Nees in Hook. & Arn Bot. Beech. Voy 248 Kumaon, Duthie (ex Hackel).

Var. Hænkni; panicle 5-6 in. compound, branches with 4-8 spikes, sessile spikelets i in., gl. I rarely putted slightly depressed along the middle line, keels rigidly coliolate. A. Hænki, Prest Ret. Hænk i 340. A. Vachelii, β, Hook. & Arn. l.c. A. leptanthus, Steud. Syn. i. 391. Rhaphis stricta, Nees in Hook. Kew Journ. ii. (1850) 99.—Ceylon (C.P. n. 411 in part).

Val. caucasicus; panicle 3-4 in. subsimple, branches simple or subdivided, sessile spikelets 1 in., gl. I not pitted sparsely hispid below the middle. A. caucasicus, Trin. in Mem. Acad. Petersb. Ser. VI. ii. (1833) 286. Sorghum caucasicum, Griseb.

in Ledeb. Fl. Ross. iv. 476 .- Black Mts., Duthre.

Var. punctatus, panicle 4-6 in. compound, branches with many spikes, sessile spikelets 1- in., gl. I pitted sparsely harry below the middle, keels rigidly ciliolate. A. punctatus, Trin. Sp Gram. Ic t. 328; Steud. Syn. Gram. 391 (an Roxb.?). A. perfossus, Nees ex Steud. l. c .- Common.

? 25. A. montanus, Roxb. Fl Ind. i. 267 (non Benth. & Hackel); tall, ascending from a stout creeping base, leaves long slender, panicle tall pyramidal, branches subverticilled capillary strict bearing one or several very slender elongate spikes, joints and pedicels sparsely hairy, spikelets

minute, gl. I not pitted sparsely hairy. Kunth Enum. Pl. i. 506 PA. saccharoides, Roxb. I. c. 263 (non Sw.).

NORTHERN CIRCLES, Roxburgh

Stem 3-4 ft., as thick as a large crow-quill, creeping and nodose below. Leaves remarkably long, a little hairy on the upper side near the base only; mouth of sheath bearded. Panicle 4-8 in , pale green .- There are two excellent drawings of this plant in Royburgh's collection (Nos. 90 and 889) both marked A. montanus, in which the lower branches of the panicle are 3-nate, the rest alternate, all bearing several spikes of about an inch long. Two other of Roxburgh's drawings, n. 890 and 2017, of which the latter bears the name of saccharoides, represent a plant differing apparently from montanum only in the panicle being composed of simple shortly pedicelled much longer spikes. The difference between the two forms is analogous to what occurs in A. intermedius, from which A. montanus differs in the much more slender pale green panicle, and spikes with minute spikelets, and in the capillary joints and pedicels not being represented as compressed and as being laxly covered with distant long spreading hairs. As to this latter character, which is uniform in all four drawings, allowance must be made for native artists' work. I have seen no plant resembling this species, which is a native of a region botanically urexplored since Roxburgh's day. It has obviously no affinity with that which Hackel, following Bentham, has described as montanus, Roxb., and which plant Roxburgh probably never saw.

26. A. odoratus, Dna. Lisboa in Journ. Bomb. Nat Hist. Soc. iv. (1889) 123, cum Ic. & vi. (1891) 68, 203; aromatic, stem stout, nodes villous, leaves long broad, sheaths compressed, spikes few or many densely fascicled stipitate silky purplish, rachis and branches glabrous, sessile spikelets  $\frac{1}{6}$  in., callus densely silky, gl. I oblonglanceolate truncate 7-nerved rarely pitted villous below the middle keels scaberulous.

The DECCAN; Khandeish, Poona, &c., Lisboa

Stem 3-4 ft., as thick as a swan's quill at the base, sparingly branched, leafy. Leaves 1-2 ft, by \(\frac{1}{6}-\frac{1}{3}\) in., flat, acuminate, scaberulous on both surfaces and on the margins, bright green, nerves strong; sheath long, glabrous, smooth, upper sheathing the base of the inflorescence; ligule membranous, truncate. Panicle 2-4 in.; branches filiform and spikes 1-2 in. subcrect, slender, flexuous; spikes rather tenacious, joints and pedicels flattened with a translucent centre, tips truncate. Sessile spakelets, callus-hairs half as long as the gls.; gl. I thin, rarely pitted, nerves slender, tip truncate, hyaline, nerveless; II keeled, thin, obtuse or truncate, ciliate; III shorter than II, ovate-lanceolate, eciliate, nerveless; awn about \$\frac{1}{4}\$ in., faintly dilated towards the base. Pedicelled spikelets as long as the sessile or rather longer; gl. I narrow, many-nerved, dorsally glabrous; II 3-nerved, ciliate; III shorter, oblong, obtuse, nerveless, ciliate.—The compressed sheaths, panicled spikes, villous gl. I of the sessile spikelets, and aroma, seem to distinguish this from A. Kuntzeanus, which it strongly resembles in a dry state.

- \*\* Pedicels of upper spikelets and joints of rachis subterete, not or obscurely channelled, with no translucent centre. (See also 20. concanensis.)
- 27. A. fascicularis, Roxb. Fl. Ind. i. 265; annual, slender, leaves linear, sheaths hardly compressed, panicle oblong, branches subsolitary flowering almost to the base sparingly divided, spikes slender subsessile, joints and pedicels linear subterete or compressed not channelled shortly rigidly ciliate, sessile spikelets  $\frac{1}{3}$  in., gl. I ovate-lanceolate flat smooth scabrous or shining 7-9-nerved keels shortly ciliate towards the VOL. VII.

truncate tip. Steud. Syn. Gram. 392; Hack. Monogr. Androp. 541. A. gangeticus, Hack. l.c. 539.—Andropogon, Wall. Cat. n. 8816.

TROPICAL HIMALAYA, from Garwhal to Sikkim. Lower Bengal, Assam, the

CENTRAL PROVINCES, and BURMA .- DISTRIB. Tonkin. Stem 2-3 ft., decumbent and branched below, leafy, nodes glabrous or nearly so. Leaves 12-16 by \(\frac{1}{6} - \frac{1}{3} \) in., glabrous or harry, base narrowed, setaceously acuminate. scaberulous; sheath hirsute or subglabrous, mouth bearded; ligule shortly ovate. Panicle 1-2 in., long-peduncled, usually narrow, green or purplish; rachis slender, glabrous or nodes bearded; branches erect, lower usually binate covered to the base with spikes. Spikes 1-1 in.; joints few, flattened but not 2-ribbed, ciliate with white or purple hairs. Sessile spikelets dorsally flattened, callus bearded; gls thin, I glabrous on back and sides, margins involute, nerves very slender; II chartaceous, acute, 5-7-nerved; III lanceolate, 2-nerved, ciliate; IV much shorter, 2-fid, lobes triangular, ciliate; awn 1 in. long; palea 0, or minute, broadly ovate. Orary glabrous. Pedicelled spikelets neuter, narrower than the sessile; gl. I many-nerved, keels scaberulous; II acute, 7-nerved; III obovate-oblong, ciliate.—A good character of this species is the branches of the panicle bearing spikelets down close to the rachis. Hackel (who doubtfully places this in his subgenus Sorghum) describes gl. IV of the sessile spikelet as having a lanceolate acuminate glabrous nerveless palea as long as the gl.; no doubt an error.

28. A. venustus, Thw. Enum. Pl. Zeyl. 367; stems tall, leaves narrow, sheaths hardly compressed, panicle elongate interrupted, rachis and spreading opposite and alternate branches capillary glabrous, spikes small, joints 3-8 and pedicels very slender glabrous terete not channelled, sessile spikelets narrowly lanceolate acute, gl. I dorsally compressed nerveless tip 2-toothed, keels scabrid above the middle, II very shortly awned, keel smooth or scabrid upwards. Hack. Monogr. Androp. 545; Trim. Cat. Ceyl. Pl. 108.

CEYLON: Central Province, alt. 4000 ft, Thwaites.

Stem 2-4 ft., strict, subsimple, as thick as a goose-quill below and clothed with short pubescent sheaths. Leaves 12-16 in., smooth or scaberulous above, mndrib very broad and prominent beneath; sheath subcompressed, smooth; ligule a ridge of hairs. Panicle 12-16 in., dull purplish, much branched. Spikes narrow, laxfid., joints 3-8 and pedicels = \frac{1}{2}\text{ the sessile spikelets. Sessile spikelets \frac{1}{2}\text{ in., slightly curved; callus small, stellately bearded with white hairs; gl. I quite smooth, flat or rather convex dorsally; II chartaceous, linear-lanceolate, acuminate, 3-nerved, keel acute; III smaller, ovate, acuminate or aristulate, ciliate above, 1-3-nerved; IV linear, 2-fid, awn very slender. Pedicelled spikelets longer than the sessile and more acuminate, nearly glabrous, male; gl. I 7-nerved, 3 towards the margin on each side; II and III as in the sessile; IV narrow, glabrous, awn 0.—Hackel, who places this in subgen. Vetweria, describes gl. I of the pedicelled spikelet as 5-nerved. The habit spikelets and glumes are those of subgen Amphilophis, but the joints and pedicels are not channelled. Duthie (Grass. N.W. Ind. 22) gives the Jhelum Valley, Stewart, as a habitat, doubtless erroneously.

- B. Spikes small, of 1-3-rarely 4 pairs of spikelets, often reduced to 3 spikelets, a sessile and 2 pedicelled. Panicle more or less pyramidal, rachis and branches capillary.
- 29. A. micranthus, Kunth Revis. Gram. i. 165, Enum. Pl. i. 504; stem erect or ascending simple or nearly so, leaves linear base hardly narrowed sheaths closed, spikes of 2-3 pairs of spikelets, joints and pedicels shortly ciliate or subglabrous, sessile spikelets  $\frac{1}{10}$  in., gl. I linear-oblong dorsally channelled glabrous scaberulous or villous, keels minutely subpectinately ciliate. Steud. Syn. Gram. 396; Hack. Monogr.

Androp. 488; Lisboa in Journ. Bomb. Nat. Hist. Soc. iv. (1889), vi. (1891) 69. A. alternans, Presl Reliq. Hænk. 1. 342; Kunth Enum. l. c. 502. A. cœrulescens, Kunth l c. 504. A. capilliflorus, Steud. in Zoll. Syst. Verz. 58. A. parvispica, Steud. l. c. 397. A. serratus, Miq. Prolus. Fl. Jap. i. 192. Anatherum parviflorum, Spreng. Syst. i. 290. Chrysopogon violascens, Trin. in Mem. Acad. Petersb. Ser. VI. ii. (1893) 319. Sorghum parviflorum, Beauv. ex Roem. & Sch. Syst. ii. 840. Rhaphis cœrulescens, Desv. Opusc. 69. R. microstachya, Nees ex Steud. l. c. 397. Holous cœrulescens, Gaud. in Freyc. Voy. Bot. 411, t. 27. H. parviflorus, Br. Prodr. 199.

WESTERN HIMALAYA, from the Ravi to Kumaon, alt. 4-6000 ft. Khasia Hills, alt. 5000 ft., Clarke. The Nilghiri, Concan and Deccan Hills.—Distrib. E. Asia and Malaya, Australia, S. Africa.

Stem 2-3 ft., as thick as a crow-quill or thicker, terete, nodes more or less bearded. Leaves 6-12 by  $\frac{1}{6}-\frac{1}{6}$  in., setaceously acuminate, flat, more or less hairy with tubercle-based hairs, surfaces and margins scaberulous, base rounded; sheaths tight; ligule short, truncate. Panicle 2-6 in., oblong or pyramidal; rachis and branches spreading, perfectly smooth, flexuous. Spikes  $\frac{1}{6}-\frac{1}{3}$  in., pale yellow violet or red-brown, joints and pedicels slender often ciliate on one margin only. Epikelets small, callus stellately bearded; gl. I narrowly truncate, 4-6-nerved, scaberulous in all the specimens I have examined; margins narrowly inflexed; II lauceolate, acuminate or mucronate, scaberulous, 1-3-nerved; III short, obtuse, eciliate, nerveless; IV awn  $\frac{1}{3}$ - $\frac{3}{9}$  in. Pedicelled spikelets male, callus naked; gl. I oblong, 7-nerved, margins hardly inflexed, II oblong, obtuse, 3-5-nerved; III oblong, hyaline; IV narrow, awnless.—Spikes often reduced to 3 spikelets, a sessile and 2 pedicelled males—I have not cited Hackel's synonymy and authorities for the non-Indian forms with more spikelets in each spike. It is very difficult to distinguish A. micronthus from small forms of A. assimilis. I have seen no specimens from Lishoa.

Var. villosulus, Hack. l. c. 490; usually much stouter, sheaths bearded at the nodes and leaves hispidly hairy, gl. I of sessile spikelets often hispidulous. A. villosulus, Steud. Syn. Gram. 397; Lisboa in Bomb. Journ. Nat. Hist. vi. (1891) 69—(villosus). Chrysopogon villosulus, Nees ex Duthie Grass N.W. Ind. 23 (excl. some Syns.). C. montanus, Duthie Fodd. Grass. N. Ind. 40. Rhaphis villosula, Nees ex Steud. l. c.—Kumaon, Royle, &c. Rajputana, Mt. Aboo, Duthie. Behar, on Parusnath, J. D. H, &c. Khasia Hills, Greffith.

30 A. assimilis, Steud. in Zoll. Syst. Verz. 58; Syn. Gram. 397; suffruticose, fastigiately branched from a decumbent base, leafy, leaves linear-lanceolate much narrowed to the base, lower sheaths open, branches of pyramidal panicle capillary at length widely spreading, joints and pedicels shortly ciliate, sessile spikelets  $\frac{1}{10}$  in., gl. I oblong or linear-oblong narrowly truncate glabrous or silkily villous below the middle 2-5-nerved between the shortly pectinately ciliate keels. Miq. Fl. Ind. Bat. iii. 489. A. montanus, Benth Fl. Hongk. 423 (excl. Syn.); Hack. Monogr. Androp. 491 (excl. Syn.); Lisboa in Journ. Bomb. Nat. Hist. Soc. vi. (1891) 203. A capillaceus, Wall. mss. A. glaucopsis & subrepens, Steud. l c. Chrysopogon pictus. Hance in Ann. Sc. Nat. Ser. 5, v. (1866) 252. C. glaucopsis, Duthre Grass. N.W. Ind. 22. Rhaphis repens, Nees ex Steud. l. c.—Chrysopogon, Wall. Cat. n. 8781, 8786, 8787, 8790.

TEMPERATE HIMALAYA, from Kashmir to Sikkim, ascending to 5°00 ft. The KHASIA and MUNNEPORE HILLS. BEHAR; on Parusnath, alt. 4000 ft. Burma, Wallock. Rajpootana, Duthie. The Decoan and Central India, King, &c.—DISTRIB. Java, China, Japan.

Stems 6 to probably 12 ft. or more; as thick as a goose-quill at the base, hard, shining, sometimes proliferously branched here and there, nodes more or less bearded.

Leaves  $2\frac{1}{2}$ -6 by  $\frac{1}{10}$  in., setaceously acuminate, rather flaccid, glabrous or sparsely hairy on both surfaces, margins subserrulate; sheaths usually bearded at the mouth, upper appressed, lower open and often divariente, ligale obscure. Panicle 2-5 in., triangular, ternately branched; rachis and branches capillary, glabrous, axils more or less bearded. Spikes \(\frac{1}{2} - \frac{1}{3}\) in., joints and pedicels very slender, hairs not longer than the joint. Spikelets pale green; gl. I membranous, margins incurved sometimes cil ate with a few very long hairs, flat or concave towards the centre: II acute, margins nearly glabrous, keel flattened ciliolate above; III ovate, obtuse, glabrous; IV awn 1-12 in., slender, base acute. Pedicelled spikelets larger than the sessile, male or neuter; gl I linear-lanceolate, green or reddish, glabious or ciliate, 7-nerved, keels ciholate; II 3-5-nerved; III & shorter, oblong, glabrous, nerveless: IV 0 -I have seen no Javanese or other authentic specimens, and hence assume the correctness of Hackel's identification of the Indian plant with it. It is certainly not Roxburgh's A. montanus.

31. A. Hugelii, Hack. Monogr. Androp. 492; stem erect branching from the base, nodes bearded, leaves much narrowed below or petioled linear scaberulous, panicle ovate-oblong, spikes with 2-3 pairs of spikelets, joints shortly ciliate, sessile spikelets 1 in, gl. I oblong or oblonglanceolate glabrous or villous below the middle 7-nerved tip truncate keels ciliate with long hairs, III minute ovate. Lisboa in Journ. Bomb. Nat. Hist. Soc. vi. (1891) 69.

WESTERN HIMALAYA? Huegel. RAJPOOTANA, on Mt. Aboo, King, &c. CENTRAL INDIA and the CENTRAL PROVINCES, Duthre, &c

Stem shortly creeping or sufficiencent below, often red, branches 21-31 ft. Leaves 4-10 by \(\frac{1}{3}\) in., acuminate, puberulous beneath, margins scaberulous sometimes ciliate with long hairs; sheath slightly compressed; ligule short, membranous, ciliate. Panicle 2-31 in., shining, branches capillary, axil, softly bearded. Spike, about  $\frac{1}{3}$  in. long, green or purplish; gl. I of sessile spikelets truncate, chartaceous, dorsally polished, margins narrowly incurved, cilia of keels very variable in length; II glabrous, truncate, apiculate, ciliate, keel much thickened; III minute, ovate, glabrous; awn of IV  $\frac{1}{2} - \frac{2}{3}$  in., base very slender. Pedicelled spikelets rather longer than the sessile, lanceolate, green or purple; gl I 9-11-nerved, keels and back ciliate; II as long, acuminate, 5-nerved, ciliate; III nearly as long, hyaline, oblong, obtuse, glabrous; IV very narrow. - I have seen no typical specimen of this plant which Hackel described from Huegel's specimens, of which the habitat is unknown. The gl. III he describes as absent, an oversight, as it is present in spikelets of the type kindly procured from Vienna for me by Dr. Stapf, and in those collected by King, Duthie and others. Lisboa I c. 69 describes a var. fætadus. Hack, mss as common all over the Bombay Presidency, and as having a soft and very pleasant smell I fail to find any characters in the specimens I have examined, or in the descriptions given, to distinguish it from A. Hugeli, except that according to Lisbon the pedicelled spikelet of fætidus has no gl. IV.

32. A. Schmidii, Hook f.; stems subsimple or branching below, ascending leafy, nodes bearded, leaves lanceolate acuminate rigid scabrid above base suddenly contracted, sheaths terete smooth, panicle contracted, branches short erect, sessile spikelets broadly oblong obtuse convex 5-7nerved between the very shortly ciliate and sparsely hairy kerls, margins narrowly incurved, II broadly oblong glabrous 3-nerved, III very small ovate, IV a slender awn.

NILGHIRI HILLS; Schmid; Nadavatum, in pastures, alt. 6000 ft., Lawson.

Stem 3-4 ft., rather stout, red-brown, smooth. Leaves 3-5 by \frac{1}{6-\frac{1}{3}} in , finely acuminate, midrib strong, scabrid above with sometimes tubercle-based bristles, scaberulous beneath, margins scaberulous; sheath long, mouth bearded; ligule obscure. Paniele 2-4 in., loosely or densely branched; branches and branchlets

smooth. Spikelets brown or dull green, callus short, broad, shortly bearded; gl. I rather coriaceous, dorsally shining, smooth or scaberulous; II chartaceous: 1II broadly ovate, obtuse, nerveless; IV awn ‡ in., very slender. Pedicelled spikelets nariower; pedicels shortly ciliate; gl. I 9-nerved, ciliate all over; II narrowly lanceolate, 5-nerved, margins ciliate; III oblong; IV 0—A stouter grass than the foregoing, with very scabrid leaves and much broader spikelets. Allied to A. micranthus, differing conspicuously in the rigid scabrid foliage.

33. **A. filiculmis,** Hook. f.; annual, stem elongate filiform flaccid much branched, nodes bearded, leaves 2-4 in. linear-lanceolate finely acuminate flaccid base suddenly narrowed, sheaths lax lower open, panicle long-peduncled lax-fld., rachis and branches capillary, pedicels of upper spikelets chiate with long hairs, sessile spikelets  $\frac{1}{10}$  in. oblong-lanceolate obtuse 5-7-nerved between the keels villous below the middle or all over, keels ciliate with long slender hairs.

The DECCAN; Poonah, in rocky places, Jacquemont (n. 310); MAWAR; Dhom-

sha, Woodrow (Herb. Bomb. n. 26.)

Stems 2-3 it., apparently decumbent and interlaced, copiously geniculately branched throughout, quite glabrous, very weak, internodes long pubescent. Leaves pale green, \(\frac{1}{2}\)-\frac{1}{2}\) in. broad, tip filiform, glabrous or sparsely harry beneath, margins smooth ciliate towards the very narrow base, costa and nerves very slender; sheaths long, narrow, spreading at the ramifications, glabrous, bearded at the top; ligule broad, membranous, ciliate. Panacle 1-2 in., branches few of extreme slenderness. Spikelets pale green or white; callus densely shortly villous; gl. I of sessile membranous, nerves faint; II oblong, trancate, mucronate, 3-nerved, glabrous; III very small, ovate, nerveless, eciliate; IV, awn \(\frac{1}{2}\)-\frac{1}{2}\) in., column brown twisted. Pedicelled spikelets narrower than the sessile; gl. I lanceolate, tip truncate mucronate, 7-9-nerved, ciliate; with long hairs; II as long, ovate-lanceolate, acute, strongly 5-7-nerved; III broadly oblong, hyaline, nerveless; IV 0.—A very delicate grass. The sessile spikelets of Jacquemont's specimens are nearly glabrous, of Woodrow's densely villous, with snow-white hairs.

34. A. pteropechys, Clarke in Journ. Linn. Soc. xxv. (1889) 88, t. 38; stem very slender, nodes bearded, leaves very narrow, upper sheath spathsform, paniele subpyramidal, branches few capillary villous beneath the few pale brown spikes, spikelets 3-5, joints and pedicels shortly ciliate, sessile spikelets \(\frac{1}{6}\) in., gl. I oblong obtuse 9-nerved glabrous keels pectnately ciliate for the upper \(\frac{2}{3}\). Hack Monogr. Androp. 690.

MUNNEPORE; on Jakpho and Kohima, alt 5500-7500 ft., Clarke.

Perennial. Stem 2-3 ft. erect from a creeping rootstock, sparingly branched, leafy upwards, nodes thickly bearded. Leaves 3-6 by \(\frac{1}{2}\) \(\frac{1}{2}\) in., fluely acuminate, narrowed towards the base, above and margins scaberulous; beneath sparsely hairy; sheaths closed, glabrous; ligule very short, ciliate. Panicle 2-3 in.; branches 3-6, ascending, flexuous, glabrous except below the spikes where they are villous with brown hairs. Spikes \(\frac{1}{2}\) \(\frac{2}{3}\) in.; pedicels of upper spikelets very slender, = \(\frac{1}{2}\) the sessile spikelets and joints grooved Spikelets erect, callus hairs = \(\frac{1}{2}\) the spikelet; gl. I dorsally quite glabrous; II ovate-lanceolate, acute, 3-nerved, ciliate; III small, ovate, nerveless; awn \(\frac{1}{2}\) in.; capillary, base acute. Pedveelled spikelets narrower than the sessile; gl. I 9-11-nerved; II 3-nerved; III oblong, obtuse, glabrous, nerveless.

Subgen. VI. Sorghum, Hack. Spikes panicled, tips of branchlets of panicle not bearded, joints 1 or few and pedicels filiform not or obscurely grooved ventrally, tips truncate. Spikelets few, often large, more or less dorsally compressed, broadly oblong ovoid or lanceolate; callus short; gl. I of sessile spikelets corraceous, often shining, margins narrowly inflexed

above, involute below; II awnless; III hyaline, 2-nerved; IV entire or 2-fid and awned in the cleft, rarely awnless. *Lodicules* (in the Indian species) ciliate.

35. A. halepensis, Brot. Fl. Lusit. i. 89; perennial, tall, stout or slender, panicle decompound, rachis of spike fragile, joints bearing a circular scar with entire margins, pedicelled spikelets usually male about as long but narrower than the sessile, pedicel = 1 the sessile spikelet. Sibth. Fl. Gree. i. t. 68; Kunth Enum. Pl. i. 502, Suppl. 412, t. 40, f. 1; Steud. Syn. Gram. 394; Thw. Enum. Pl Zeyl. 366. A. arundinaceus, Scop. Fl. Carn. Ed. ii. 274. A. avenaceus, H. B. & K. Nov. Gen. § Sp. i. 189. A. controversus & dubitatus, Steud. Syn. Gram. 391, 394. A. laxus, Roxb. Fl. Ind. 1.271 (non Willd.). A. miliaceus, Roxb. l.c. 272; Hack. Monogr. Androp. 541. A miliformis, Schult Mant. ii. 448. A. Sorghum, subsp halepensis, Hack. l.c. 501. Sorghum capense, Herb. Heyne ex Wall. Cat. n. 8778 C. S. dubium, C. Koch in Linnea, xxi. (1848) 443. S giganteum, Edgew in Journ As. Soc Beng. (1852) 181. S halepense, Pers. Syn. 101; Reichb. Ic. Fl. Germ. t. 54, T. Nees Gen. Fl. Germ. Monocot. 1. n. 54, t. 91; Nees Fl. Afr. Austr. 88; Griseb Fl. Brit. W. Ind. 560; Benth Fl. Austral. vn. 540; Wall. Cat n. 8778; Trim. Cat. Ceyl. Pl. 108, Aitchis. Cat. Panjab. Pl. 175; Duthie Grass. N.W Ind. 23, Fodd. Grass N. Ind. 40, t. 27. S. saccharatum, Hohen. Pl. Nilghiri, n. 1284 (non Pers.) S. Schreberi, Tenore Fl. Neap. Syll. App iv. 4. Blumenbachia halepensis, Koel. Descr. Gram. 29. Trachypogon avenaceus, Nees Agrost. Bras. 354. Holcus halepensis, Linn Sp. Pl. 1047; Host Gram. Austr. i. t. 1; Schreb. Beschr. Græs. 1. t. 18, Jacq. Erlog. Gram. t 48. H. decolorans, Willd. Sp. Pl. iv. 931. H. Catamucha, Ham. ex Wall. Cat. n. 8778 F.

Throughout India, Burma and Ceylon in open places.—Distrib. Most warm countries.

Roots creeping, stoloniferous. Stem 3-15 ft., erect, leafy, simple or branched, nodes pubescent Leaves 8-18 in., or more, up to 3 in. broad, narrowed to the rounded base, tip filiferous, glabrous except towards the often villous base, flat or waved, midrib broad, margins scabridly serrulate; sheath terete; ligule rounded. Panicle 6 in. 2 ft., very variable in form and amount of ramification, typically pyramidal with long subcreet or spreading or drooping whorled branches, axils often bearded. Spikes of 1-3 rarely 5-7 pairs of spikelets, sometimes reduced to a triplet of a sessile fertile and 2 pedicelled male rarely neuter spikelets, joints of rachis and pedicels angular or compressed, glabrous or shortly cultate. Sessile spikelets 1 to nearly 1 in, usually lanceolate, green or purplish, callus sparsely bearded; gl. I with involute sides embracing the others, more or less silkily hairy, rarely glabrous, 5-11-nerved above, there keeled and chate tip depressed or not hyaline; II subcoriaceous, chartaceous and keeled above, margins ciliolate; III shorter, elliptic-oblong, hyaline 2-nerved; IV smaller, ovate, obtuse, entire or 2-fid, awned or not, awn  $\frac{1}{0}-\frac{1}{2}$  in. or shorter; palea linear-oblong, obtuse, ciliate. Pedicelled spikelets linear-lanceolate, gl. I glabrous 5-9-nerved, margins inflexed, keels subpectinately ciliate, II lanceolate, 3-5nerved; III and IV, if present, hyaline —I have restricted the synonymy of this grass chiefly to Indian names, and those under which good figures are given. It is no doubt the wild form of the following (A. Sorghum) and its grain has long been used by natives of India. But whether the Sorghum form originated from cultivation of the wild in India, or in Africa, where both are very common, can be only a matter of conjecture. Both seem to be now cultivated in India according to Watt (Dict. of Economic Products of India) and others, and transition forms are frequent. Hackel, who treats A. halepensis as a subspecies of A. Sorghum, subdivides it under 5 varieties and 6 subvarieties, founded on characters too variable for use. Dr. Stapf, who has studied the African species as well as the Indian, proposes 2 varieties, or

rather prevalent forms, between which transitions occur, both vary in habit and in having awned mucronate or awnless spikelets; they are a. genuinus, of which muliaceus, Roxb., may be regarded as the type with sessile spikelets  $\frac{1}{2} - \frac{1}{5}$  in. long, it is Wall Cat. n. 8778 A. B. C. And b effusus, with sessile spikelets  $\frac{1}{5}$  nearly  $\frac{1}{5}$  in., it includes A. lawus, Roxb, A. halepensis, Wight Cat. n. 1672, and Wall. Cat. n. 8778 D. E. F. H.

36. A. Sorghum, Brot. Fl. Lusit. i. 88; annual, tall, usually very robust, panicle decompound usually thyrsiform with crowded whorls of erect branches and branchlets and spikes rarely subeffuse, rachis of spike tenacious, joints when forcibly separated leaving a ragged scar at the tip, pedicelled spikelets usually neuter, pedicels short. Roxb Fl. Ind. i. 273; Kunth Enum. Pl. i. 581; Steud. Syn. Gram. 393. A. Sorghum, subsp. sativus, Hack. Monogr. Androp. 505. Holcus Sorghum, Linn. Sp Pl. 1047; Gærtn. Fruct ii. 2, t. 80; Lamk. Encycl. t. 838; Grah. Cat. Bomb. Pl. 238; Dalz. & Grbs. Bomb. Fl. Suppl. 99.

Cultivated throughout the warmer parts of Europe, Asia and Africa.-Intro-

duced into America, Australia, &c.

Under A. halepense I have alluded to A. Sorghum as the cultivated form of that plant. Of the early history of its culture nothing is recorded, it having no Sanskrit name, and there is no evidence of its being known to the ancients of Europe or the East. Variable as it is, its forms appear to be much less fixed than those of wheat and barley, which gives rise to the suspicion that they are of comparatively recent origin. Many authors have endeavoured to limit by botanical characters some or all of its known varieties, and more have applied specific names to forms they could not, or did not try to identify with known ones. The result is a redundancy of names, and an inextricable synonymy. Watt's "Dict. of Economic Products of India" has treated in great detail the culture of many varieties, but under names that have little or no significance. Hackel has essayed to clean this Augean stable, and has devoted 15 pages of his Monograph to the forms of A. Sorylum, of which he describes 37 varieties and 12 subvarieties. His earnest and meritorious attempt has the great advantage of approximately harmonising most of the Indian citations and synonyms, and I therefore give a precis of it. It, however omits characters of the glumes which Dr Stapf, in working up the African forms, has studied, and which characters appear to be of far more importance than those relied on by Hackel. Unfortunately it is not possible to combine the two classifications, for the obvious reason that Stapf's characters have been neglected in the descriptions of previous investigators, and it remains for the Indian botanists in this case, as in that of Pennsetum typhoideum, and indeed many other cultivated plants, to remove this reproach to Indian botany. Hackel's Indian varieties are as follow .--

Var. Roxburghii, Hack. l.c. 510; panicle lax ovate-oblong, rachis elongate, branches drooping, sessile spikelets ovate awnless, gl I keeled in the upper third, grain white—A. saccharatus, Roxb. Fl. Ind. i. 271; Dalz. & Gibs. Fl. Suppl. 99 (non Kunth).

Var. Wightii, Hack. l.c. 511 characters of var Roxburghii, but panicle more dense, branches scabrid, spikelets broadly elliptic, gl. I harry in the upper half.

Herb. Wight n. 185.

Var. vulgaris, Hack. l. c. 515; panicle dense, branches erect or erecto-patent, sessile spikelets \( \frac{1}{2} \) in. obovoid or subglobose obtuse awned; A. Sorghum, Rowb. l. c. 269; Sorghum vulgare, Pers. Syn. i. 101; Reichb. Ic. Fl Germ. t. 80; Duthie Grass. N.W. Ind. 23, Field \( \frac{9}{2} \) Gard. Crops. 25, t. 6, Fodd. Grass. N. Ind. 41; Holcus Sorghum, Linn.

Var. cernuus, Koern. Handb. Getreit. i. 314; very robust, paniele drooping ovoid obtuse compact, rachis and appressed branches short suberect subvillous sessile spikelets \(\frac{1}{2} - \frac{1}{2}\) in. broadly obovoid or rhomboid obtuse awned whitish densely silkily villous or glabrescent dorsally, grain globose white with a black

hilum. A. cernuus, Kunth l. c. (excl. Syn. Roxb.). A. compactus, Brot. l. c. 88; Sorghum cernuum, Host Gram Austr. iv. t. 3; Reichb. Ic. Fl Germ. t. 80. Holcus cernuus, Ard. in Sag. Sc. e Lett. Acad. Padua, i. 12, t. 3, f. 1, 2.—S. saccharatum, Strachey & Winterbottom, from Kumaon, alt. 5000 ft. is a proliferous state.

Var. glabrosus, Hack. l. c. 517; paniele ovoid compact at length straw-colrd., sessile spikelet  $\frac{1}{5}$  in. suborbicular not awned villous.—Serampore, Voigt (in Herb.

Copenhagen.)

Var. miliformis; (not A. miliformis, Schult.); panicle dense, sessile spikelets 1 in. suborbicular at length straw-colrd. strigosely hairy, gl. IV with an exserted

mucio, grain dark brown or violet brown.

Var. bicolor, Hack l. c 519; panicle very dense, sessile spikelets  $\frac{1}{6}$  in obtusely hexagonal awnless at length black, gl. I coriaceous below the middle, then deeply rugged, upper part strate harry, gram almost twice as long as the gl. white. ?A. bicolor, Kunth l. c 501, non Roxb; ?A. cernuus, Roxb. Fl. Ind. i 270. ?Sorghum bicolor, II illd. Enum Hort Bend 1036 ?Holcus bicolor, Lum. Mant. ii. 301.—Deccan Peninsula, Herb. II ight n 185 B.

Dr. Stapf's arrangement of the Indian forms (including many of the African) is the following. I do not cite the habitats and synonyms of the varieties given by Hackel, for to do so might include plants to which the characters adopted by Dr. Stapf n ay not apply:—

\* Glume I of sessile spikelets not depressed below the tip.

Var. hians, Stapf; gls. I and II divaricate exposing the white grain, tip of gl. I

coriaceous.—S. vulgare, Pers. B. II ight Cat. n 1670 (not in Hackel)

Var. Roxburghu; Hack. l.c 510; tip of gl. I hyaline, nerves obscure, sessile spikelets  $\frac{1}{5}$  in. ovate acuminate awnless.—Wall. Cat. n. 8777 D. (the right hand specimen) F. H.

Var. saccharatus, Koern.; spikelets 1/5 in. ellipsoid acute or apiculate awned, tip

of gl. I hyaline, nerves obscure.

Var. Thomson, Stapf; spikelets 1 in. ovate, gl. I strongly nerved below the tip.

—A single specimen from Upper Gangetic Plain, Thomson.

\*\* Glume I of sessile spikelets depressed below the tip, nerves distinct up to or near to the base.

Var. nervosus, Stapf; Hack. l. c. 513.—S. India, Herb. Rottler.

\*\*\* Glume I of sessile spikelets depressed below the tip, nerves distinct below the tip only.

Var. obovatus, Hack. l. c. 514; panicle very loose, gl. I and II at length more or less black and shining.—Wall. Cat. n. 8777 E. J. L.

Var. vulgarus, Hack. l. c. 515; paniele erect contracted, gl. I of sessile spikelets  $\frac{1}{6}$  in. neute depressed and triangular for the upper  $\frac{1}{3}$ .—Wall. Cat. n. 8777 A; C is a form with smaller spikelets, only  $\frac{1}{6}$  in. long.

Var. militjormis, Hack. l.c. 518 (not A miliformis, Schult.); panicle erect contracted, gl I of sessile spikelets \( \frac{1}{6} - \frac{1}{7} \) in. truncate depressed part very narrow

reddish.

Var. cernuus, Koern.; Hack. I.c. 576; very robust, panicle forming a dense ovoid or oblong cernuous or decurved head, sessile spikelets small almost orbicular usually tomentose.—Wall. Cat. n. 8777 B. G. K.

37. **A. Stapfii,** Hook. f.; annual, stems short branching from the leafy base, leaves 2-3 in. linear-oblong acute base cordate, panicle erect slender loose, branches few short erect, spikelets few  $\frac{1}{6}$ - $\frac{1}{4}$  in. ovoid erect acute silkily villous with white hairs, gl. 1 ovate 9-11-nerved tip 2-toothed, and II very corraceous.

TINNEVELLY, at Palamcottah, Wight.

Stems many, 12-16 in., spreading from the fibrous roots; geniculately ascending,

quite smooth. Leaves \(\frac{1}{3}\) in. broad, flaccid, flat, margins smooth, nerves 3-5 on each side of the slender midrib, sheaths of lower short open, of the upper long rather loose, quite glabrous; ligule very short, membranous, glabrous. Panicle 2-4 in.; rachis and branches stiff, angular, subscaberulous, rather stout, green. Spikes of 1-3 pairs of rather distant white spikelets; joints = 3 the sessile spikelet, stout, shortly villous truncate, pedicels = } the spikelet, more slender. Sessile spikelet terete; callus very short, stellately bearded with white hairs; gl I and II very coriaccous both with strongly incurved sides, nerves very slender with many cross-nervules; III oblong, truncate, hyaline, 2-nerved, ciliate; IV short subrhomboidal, cleft to the middle into triangular acute ciliate lobes; awn in the cleft ? in., smooth, slender; palea linearoblong, ciliate, nerveless. Anthers long. Pedicelled spikelets very narrow, imperfect. neuter, gl I lanceolate, 9-nerved, bicuspidate; II shorter, 5-nerved.-A closely allied species, with similarly densely silky white spikelets, has been collected by Lunt in Southern Arabia, where it is stated to be cultivated. It is a stout plant with much larger leaves and the habit of the ordinary Sorghum. The spikelets are shorter and broader than in A. Stapfii, and are collected in a dense oblong panicle.

38. **A. serratus**, Thunb. Fl. Jap. 41; tall, erect, leaves narrowly linear, base narrow, lower branches of subsimple narrow elongate panicles wholed, spikes solitary 2-8-jointed, joints pedicels and callus shortly villous with rufous or purple hairs, sessile spikelets  $\frac{1}{7} - \frac{1}{6}$  in ovoid ellipsoid or lanceolate, gl. I rufously hirsute towards the pale tip and sides, IV shortly awned or awnless. Hack Monogr. Androp. 520; Grah. Cat. Bomb. Pl. 238.

Throughout India, on the hills and plains from the Panjab to Burma, and southward to CEYLON and the NICOBAR ISLDS.—DISTRIB. Asia and Austral trop.

Perennial. Stem 3-4 ft., subsimple, nodes bearded. Leaves 4-20 by \(\frac{1}{2}\)-\frac{3}{4}\) in., setaceously acuminate, glabrous or sparsely hairy on both surfaces, hairs often tubercle-based, midrib broad; sheaths terete below keeled upward, more or less hairy; mouth sikily villous; ligule very short, truncate. Panicle 4-12 in., oblong, rachis glabrous, branches capillary, about equalling the spikes, glabrous or scaberulous, whorls distant. Spikes \(\frac{1}{2}\)-1\(\frac{1}{2}\) in., red-brown; joints and pedicels = \(\frac{1}{2}\) the sessile spikelets, margins shortly villous. Sessile spikelets, callus acute; gl. I coriaceous, dark brown or nearly black, glabious and polished on the middle dorsally, tips pale; II rather longer, lanceolate, acute, 1-nerved, hairy upwards; III shorter, lanceolate, acute; IV small, oblong, entire or 2-lobed, awned or not. Lodicules ciliate. Peducelled spikelets narrower than the sessile, paler, hairy; gl. I 7-nerved; III and IV linear, ciliate.—Roxburgh does not seem to have known this grass.

Var. genuinus, Hack.; gl. IV of sessile spikelet 2-lobed, awned in the cleft. A. serratus, Thunb. l. c. (non Retz). A. laxus, Willd. Sp. Pl. iv. 907 (non Rozb.); Steud. Syn. Gram. 391. A. tropicus, Spreng. Syst. Veg. i. 287; Kunth Enum. Pl. i. 503 (non Kunth); Thw. Enum. Pl. Zeyl. 366; Benth. Fl. Hongk. 423. A. dichroanthus, Steud in Zoll. Syst. Verz 58. Sorghum fulvum, Beauv. es Roem. & Sch. Syst. ii. 840; Benth. Fl. Austral. vii. 541; Trim. Cat. Ceyl. Pl. 108.

S. Junghuhnii, Miq. Fl. Ind. Bat. iii. 783 Holcus fulvus, Br. Prodr. 199.

Var. nitidus, Hack.; gl. IV. of sessile spikelet entire not awned. A. consimilis and pedicellatus, Steud. Syn. Gram. 394. A. fuscus, Presl Rel Hank. i. 342; Kunih l. c. 502. A. nigrum, Herb. Ham. in Wall. Cat. n. 8777 E. A. nitidus, Kunth Revis. Gram. i. 166, Enum. l. c. 510. Sorghum halepense, Wall. Cat. 8878 E. G.; Wight Cat. n. 2350. S. muticum, Nees in Herb. Wight; Aitohis. Cat. Panjab. Pl. 175; Duthie Grass. N.W. Ind. 23. Chrysopogon fuscus, Trin. ex Steud. Nom. Ed. II. i. 360. Holeus quinqueflorus, Herb. Ham. ex Wall. Cat. n. 8778 G.—Andropogon, Wall. Cat. n. 8879.

39. A. purpureo-sericeus, Hochst. ex A. Rich. Tent. Fl. Abyss. ii. 469; annual, robust, upper nodes villous, branches of subsimple panicle

few or many in a whorl flexuous, spikes subsolitary, joints pedicels and callus villous with long white or red brown hairs, sessile spikelets  $\frac{1}{3}$  in oblong-ovate, gl. I 5-7-nerved villous all over tip acute, II 2-fid, awn long stout. Hack: Monogr. Androp. 524. Sorghum purpureo-sericeum, Asch. & Schweinf Beitr. Fl. Æthiop. 310. S. Ritchiei, Munro mss.

The DECCAN, Belgaum, Ritchie. N. Canara, Woodrow. CENTRAL PROVINCES, Duthie,-DISTRIB. Abyssima.

Stem 3-4 ft., erect; stout or slender. Leaves 8-10 by \(\frac{1}{4}\)-\frac{1}{3}\) in., linear, finely acuminate, sparsely hairy, margins hardly scabrid; sheath, ribbed, glabrous or margin fimbriate, mouth villously silky; ligule very short, ciliate. Panicle 4-10 in., erect; rachis glabrous; branches \(\frac{1}{2}\)-1 in., capillary. Spikes 1-1\(\frac{1}{2}\) in., rarely of 3 joints, sometimes of one sessile and 2 pedicelled spikelets, joints about \(\frac{1}{2}\) the sessile spikelet. Spikelets erect or spreading or pendulous, dorsally flattened; gl. I coriaceous, margins involute from base to apex, keels rounded. villi red-brown or snow-white; II as long as I, acuminate or aristulate, dorsally rounded, coriaceous; III hyaline, epaleate, \(\frac{2}{2}\)-nerved, ciliate; IV very fragile, \(\frac{3}{2}\)-nerved, below the middle ciliate with long hairs; awn 1-1\(\frac{1}{2}\) in., column stout red-brown twisted glabrous; palea minute, ciliate. Pedicelled spikelets usually shorter paler and narrower than the sessile; gl. I thinner, \(\frac{7}{2}\)-nerved, shortly silky; II and III as in the sessile; IV lanceolate, acuminate, 1-nerved, ciliate, male —The Indian differs from the African plant in having rather smaller spikelets, in gls. I and II of the sessile not or less scariose at the tip. The pubescence of the spikelet is more copious and pure white in a Deccan specimen from Woodrow, and in a Panjab \(\frac{9}{2}\) one from Stewart. Hackel has named Duthie's specimens \(A\) purpureo-sericcus var. variegatus.

Subgen. VI. VETIVERIA, *Hack. Spikes* panicled, branches of panicle many, whorled; joints 3 or more and pedicels linear filiform dorsally convex not channelled, tip truncate. *Sessile spikelets* laterally or dorsally compressed, awned or not, gl. I coriaceous, narrow, margins inflexed or involute, keels muricate; II awned or not; III hyaline; IV entire or 2-fid, awned. *Lodicules* glabrous.

But distinguished from Chi ysopogon by the absence of a beard of rigid hairs on the tip of the branchlets, seen after the fall of the spike. A. venustus is removed to Amphilophis.

40. A. squarrosus, Linn. f Suppl. 433; stem stout, leaves long rigid, sheaths strongly compressed, panicle narrow, branches simple strict, spikes many-jointed joints and pedicels glabrous, sessile spikelets linear-oblong glabrous, gl. I coriaceous acute dorsally flat, margins broadly inflexed muricate, IV linear-oblong mucronate or shortly awned. Vahl Symb. iii. 9; Hack. Monogr. Androp. 542; Lisboa in Bomb Journ. Nat. Hist. vi. (1891) 67. A. muricatus, Retz Obs. iii 43, v. 21; Kunth Enum. Pl. i. 505, Suppl. 416, Roxb. F. Ind. i. 265; Wall. Cat. n. 8759; Grah. Cat. Bomb. Pl. 238, Griff. Notul. iv. 84, Ic. Pl. Asiat. t. 139, f. 57, t. 155, f. 1; Thw. Enum. Pl. Zeyl 368; Trim Cat. Ceyl. Pl. 108; Dalz. & Gibs. Bomb. Fl. 302, Duthie Grass. N.W. Ind. 90, Fodd. Grass. N. Ind. 36, t. 24. A. festuccides, Prest Rel. Hænk. i. 340. A. nigritanus, Benth. in Hook. Niger Fl. 573; Steud. l. c. 394. Anatherum muricatum, Beauv. Agrostog. 150, t. 22, f. 10, Spreng. Pugill. ii. 15. Vetiveria odorata, Virey in Journ. Pharmac. Soc. I. xiii. 499. V. arundinacea & muricata, Griseb. Fl. Brit. W. Ind. 559, 560. Mandelorna insignis, Steud. l. c. 359. Agrostis vertucillata, Lam. Dict. 59, Ill. Gen. n. 162, Suppl. i. 255. Phalaris zizanioides, Linn. Mant. ii. 183. Holcus ? Viranae, Herb. Ham. ex Wall. l. c.—Virana, Jones in As. Research. iv. 306.

Throughout the Plains and Lower Hills of India, Burma and CEYLON,

ascending to 4000 ft. - DISTRIB. Java, Afr. trop.

Stems 2-5 ft., in large, dense tuffs with stout spongy aromatic roots, sparingly branched, as thick below as a goose-quill. Leaves 1-2 ft., subbifarious, narrow acute, erect, keeled, glabrous, margins scabrid; sheaths equitant, glabrous; ligule obscure. Panicle 4-12 in, conical, erect, rachis stout and erecto-patent filiform flexuous branches glabrous or scaberulous Spikes slender, joints and pedicels about the sessile spikelets. Sessile spikelets giey green yellow or purplish, 1-1 in, slightly curved, glabrous, callus obscurely bearded; gl. I coriaceous, acute, 2-4-nerved; II coriaceous, 1-nerved, margins hyaline, keel municate; III lanceolate, acuminate, 2-nerved, margins inflexed ciliolate; IV = III ciliate; palea very small, obtuse, glabrous. Pedicelled spikelets like the sessile but gl. I smooth, IV awnless.—Khus-khus grass.

41 **A. Lawsoni,** *Hook. f.*; stem erect from a stout rootstock, leaves narrowly linear curved acute or obtuse tips serrulate, sheaths compressed, panicle narrow elongate branches erect, spikes pale, joints 6-8 and pedicels slender obliquely truncate, gl. I linear rigid keels muricate dorsally flat scaberulous margins inflexed, II awned keel pectinately ciliate above the middle, IV 2-toothed awned.

Mysore; at Bandypore, alt 3000 ft., in moist ground, Lawson.

Rootstock horizontal; stems simple, slender, internodes very long. Leaves chiefly subradical, 2-5 by \( \frac{1}{2}\) in., exactly linear, rigid, base not contracted, margins ciliate, nerves 4-8 strong; sheath of lower very short, of cauline very long, strate; ligule a ridge of hairs. Panicle 6-7 in., branches or peduncles of spikes opposite and fascicled, and branchlets slender puberulous with a white scurf. Spikes \( \frac{1}{2}\) in., pale reddish, erect; joints very obliquely truncate, tips obscurely ciliate, and pedicels nearly = spikelet, slender, compressed. Sessile spikelets \( \frac{1}{2}\) in., linear-lanceolate, callus bearded with silky hairs; gl. I coriaceous, tip obtuse, bristly; II cymbiform, tip 2-fid, awn longer than the gl., base ciliate; III oblong, ciliate, nerveless; IV arched, linear, obtusely 2-toothed, awn very slender; palea oblong, ciliate, nerveless. Anthers long. Pedicelled spikelets male, longer and narrower than the sessile, callus naked, gl. I 3-nerved, awned, keels pectinately ciliate; II acummate, awned; III and IV oblong, obtuse, ciliate.—The tips of the branchlets bearing the spikes have a few short unequal bristles, showing an approach to those of Chrysopogon.

Subgen. VII. Chrysofogon, Hack. Spikes of 3 spikelets, solitary or subsolitary (1-4 in C. Gryllus) on the capillary whorled branches of an erect or inclined panicle; branches with obcome obliquely truncate tips crowned with a ring or beard of stiff hairs. Spikelets 3-nate, a sessile bisexual, and 2 pedicelled males or neuters. Sessile spikelets narrow, laterally compressed; gl. I narrow, linear, rigid, erect, 4-nerved, usually laterally compressed; II broader, laterally compressed, obtusely keeled, 3-nerved, tip 2-lobed awned or not; III hyaline, 2-nerved; IV the narrow hyaline 1-3-nerved base of a long awn. Pedicelled spikelets dorsally compressed; gls. I and II awned or not.—Ligule of minute hairs in all.

The only subgenus with the tips of the branches of the panicle bearded, as best seen after the fall of the spike. The genus has a better claim to be retained than most of Andropogoneæ. The species are, with the exception of the first two, very difficult of definition, and must be regarded as merely provisionally established.

- \* Pedicels of the upper spikelets half as long as the sessile spikelet or longer.
  - † Pedicels of the upper spikelets glabrous or nearly so.
  - 42. A. Gryllus, Linn. Cent. Pl. ii. 33; stem simple, panicle large,

branches long capillary spreading simple or branched and bearing 2-4 spikes, sessile spikelets \( \frac{1}{2-1} \) in, gl. I 2-toothed dorsally rounded with 2 muricate or mamillate keels or channels, II mucronate or aristulate keel and sides bristly above the middle. Kunth Enum Pl. i. 504; Hack. Monogr. Androp. 550; Steud. Syn. Gram. 395; Host Gram. Austr. ii. 1, t. 1; Sibth. Fl. Grec. i. t. 67; Duthie Grass. N.W. Ind. 22, Fodd Grass N. Ind. 40. A. echinulatus, glabratus & Royleanus, Steud. l.c. 395, 397. A. pallidus, Kunth Revis. Gram. i. 165. A. paniculatus, Lam. Fl. Fr. Ed. 2, in. 633; Ill. Gen 840, f. 1. Chrysopogon Gryllus, Trin. Fund. Agrost. 188; Nees Gen. Fl. Germ Monocot. i t. 93; Benth. Fl. Austral. vii. 537; Aitchis. Cat Panjab. Pl. 176. C. glabratus, Trin. in Mem. Acad. Petersb. Ser. VI. ii. (1833) 318. Rhaphis Gryllus, Desv. Opusc. 69. R. Royleana, Nees ex Steud l.c 397. R. echinulata, Nees in Royle Illustr. Bot. Himal. 417. Pollinia Gryllus, Spreng. Pugill. ii. 10; Reichb. Ic. Fl. Germ. t. 54. P. pallida, Roem. & Sch. Syst. ii. 829. Apluda Gryllus, Presl Cup. & Gram. Sic. 55. Holcus Gryllus & pallidus, Br. Prodr. 199.— Chrysopogon, Wall. Cat. n. 8792 B. C. D.

TEMPERATE HIMALAYA; from Kashmir to Silkim, alt. 4-9000 ft. Khasia Hills, alt. 4-5000 ft.—Distrib. Eastwards to S. Europe and N. Africa, Australia.

Stems forming dense hard tufts, erect, 6 m to 5 ft. high, as thick as a goosequill below; nodes smooth. Leaves 6-18 by ½-½ in., linear, acute, glabrous or bursute, margins serrulate; sheath keeled above, glabrous or pubesceut Panucle 3-8 in.; rachis angular, scabrid, axils hearded; branches 2-4 in, usually very many in a whorl, tips obliquely truncate densely hearded. Sessile spikelets; callus smaght, acute; gl. I corraceous, shming, smooth or scaberulous, margins broadly involute; III chartaceous, lanceolate, hyaline, margins ciliate, awn = the spikelet or shorter; III linear-oblong, obtuse, nerveless; IV linear, minutely 2-toothed, awn minute or ½-1½ in.; palea small, oblong, glabrous Pedicelled spikelets rather longer than the sessile, terete, lanceolate, acuminate; pedicels glabrous or ciliolate; gl. I acuminate or aristulate, 5-9-nerved, keels ciliate above; II lanceolate, acuminate, ciliate; III and IV narrower, ciliate; awn of IV =½ the glume.—Hackel has 5 subspecies, of which 3 are Indian. 1. genunus; callus about ½ in. hairs rustybrown, awn of gl. IV 1-1½ in stout. 2. echinulatus, callus hairs pale yellow, awn ½-½ in. slender. 3. glabratus, awn of gl. II minute.

43. A. aciculatus, Retz. Obs. v. 22; stem creeping and branching below, leaves short, sheaths terete, panicle very narrow, branches strict erect, spikes solitary, sessile spikelets very narrow, callus very long acicular, gl. I linear acute or minutely 2-cuspidate convex margins broadly inflexed smooth below keels scabrid aculeolate above, II acuminate aristulate, keel ciliate above. Roxb. Fl. Ind. i. 262; Grah. Cat. Bomb. Pl. 238; Hack. Monogr. Androp. 562 A. acicularis, Willd. Sp. Pl. 1v. 906; Kunth Enum. Pl. 1. 505, Suppl. 417. A. javanicus, Steud. Syn. Gram. 396. A. subulatus, Presl Rel. Hank. i 341. Chrysopogon aciculatus, Trin. Fund. Agrost. 188; Wall. Cat. n. 8780; Wight Cat. n. 1674; Thw Enum. Pl. Zeyl. 366; Trim. Cat. Ceyl. Pl. 108; Duthie Grass. N.W. Ind. 22 (acicularis), Fodd. Grass. N. Ind. 39; Benth. Fl. Hongk. 424, Fl. Austral. vii. 538. C. subulatus, Trin. ex Steud. Nomencl. Ed. II. ii. 360; Miq. Fl. Ind. But. iii. 491. C. trivialis, Arn. & Nees in Nov. Act. Nat. Cur. xix. Suppl. 1. (1843) 171. Rhaphis accoularis, Desv. Opusc. 69. R. javanica, Nees ex Steud. Syn. Gram. 396. R. trivalvis, Lour. Fl. Cochinch. 553; Trin Sp. Gram. Ic. t. 8, 9. Centrophorum chinense, Trin. Fund. Agrost. 106, t 5.-Holcus, Griff. Notul. iii. 12, Ic. Pl. Asiat. t. 141, f. 1 (aciculatus).—Rheede Hort. Mal. xii. t. 43.

Plains and lower hills of INDIA, from Kumaon to Sikkim in the Himalaya, the Khasia Hills and southward to the Nicobar Islds. and CEYLON.—DISTRIB, Trop.

Asia, Australia, and Polynesia.

Stem woody leafy and extensively creeping below, then erect, 1-2 ft., slender. Leaves densely tufted, 1-5 by  $\frac{1}{3}-\frac{1}{6}$  in., flat, obtuse or acute, often undulate, glaucous, glabrous, margins spinulose; sheath terete; ligule a very narrow ciliate membrane. Panicle 1-3 in., pale or purplish; branches capillary, scaberulous or villous below the spikelets, tips obliquely truncate. Sessile spikelets  $\frac{1}{6}$  in.; callus nearly as long as the glumes, acicular, shortly bearded; gl. I chartaceous, obscurely 2-3-nerved or nerveless; II lanceolate, acuminate or aristulate, 1-nerved; III linear-oblong, 2-nerved; IV linear, acuminate; awn  $\frac{1}{6}-\frac{1}{6}$  in., scabid; palea small, linear, obtuse, glabrous, nerveless. Pedicelled spikelets purple, much longer and narrower than the sessile; pedicels slender, scaberulous; gl. I subulate-lanceolate, aristulate, 3-nerved, ciliate; III and IV shorter, ciliate; palea minute, cuspidate.

- †† Pedicels of upper spikelets villous with rusty rarely pale hairs.
- § Glume I of pedicelled spikelets long-awned, II not or very shortly awned.
- 44. A. verticillatus, Roxb. Fl. Ind. i. 263; tall, stout, leafy, leaves long very hairy, panicle broad of many whorls of many long simple smooth spreading arching branches terminated by solitary drooping spikelets, sessile spikelets \(\frac{1}{4}\) in., callus rather long glabrous in front, gl. I setulose beneath the tip only strongly compressed above, II glabrous keel ciliate beneath the long awn, awn of IV  $1\frac{1}{2}$  in., pedicelled spikelets  $\frac{1}{3}$  in. narrowly lanceolate glabrous 5-nerved keels ciliate at the tip only. Kunth Enum. Pl. i 506; Hack. Monogr. Androp. 555. Chrysopogon verticillatus, Trin. ex Steud. Nom. Ed. II. 1 360.

Mountainous Regions (of the N. Circars probably), Roxburgh.

Root woody, perennial. Stem 4-6 ft., terete, solid towards the base, smooth, as thick as a small goose-quill. Leaves approximate, 18 by \( \frac{1}{2} \) in., particularly hairy on the inside towards the base, margins spinulose. Panicle conical, lax, 8-10 in.; branches 2-3 in. Spikes narrow, pale. Sessile spikelets about twice as long as the pedrels, callus \( \frac{1}{16} \) in. long; gl. I 4-nerved, tip hyaline, acute; II narrow, tip 2-fid, awn as long as itself; III oblong, obtuse, margins retrosely ciliate; IV the very narrow 3-nerved hyaline base of the awn, tip obscurely 2-lobed. Pedreelled spikelets pole, shining, pedicels abruptly truncate rather laxly ciliate on the margins and dorsally; gl. I with the 2 lateral nerves nearer the margin, awn longer than itself; II lanceolate, acuminate, ciliate, 3-nerved; III very narrow, ciliate, 2-nerved; IV linear, 1-nerved, 2-fid —I have seen only a single very slender leafless specimen of what I take to be Roxburgh's plant, bearing the name in Arnott's handwriting on a ticket with Roxburgh's name in that botanist's writing in the corner. The description of the habit, leaves, &c., is taken from Roxburgh. Hackel, who does the same, describes the spikelets from a specimen also named by Arnott, and sent to him from Nees' Herbarium.

45. A. asper, Heyne in Herb. Rottler (asperum); leaves broadly linear acute base cordate midrib beneath spinulose, sheaths broad compressed laxly hirsute, panicle narrow of many whorks of short simple smooth erect branches bearing solitary rarely 2 erect spikes, sessile spikelets \(\frac{1}{2}\) in., callus long villous all round, gl. I hispid beneath the tip strongly compressed above, II keel and sides more or less hispid above the middle, awn of IV \(\frac{1}{3}\)-2 in., pedicelled spikelets \(\frac{1}{3}\) in. narrowly lanceolate 7-nerved keels ciliate.—Chrysopogon asper, Heyne ex Wall. Cat. n. 8784.

- Stem 2-3 ft., leafy below, very slender above. Leaves distichous, 12-18 by 1-1 in., exactly linear, coriaceous, flat, smooth, midrib very slender, 11-nerved, margins spinulosely serrulate, and with a few long tubercle-based cilia towards the broad semi-amplexicaul base, midrib beneath serrulate; lower sheaths ½ in. broad, keeled, armed with scattered tubercle-based hairs. Panicle 7 in., rachis smooth; branches unequal, those of the lowest whorl the longest, about 1 in., usually with only one spike, tips very shortly bearded. Sessile spikelets pale, corraceous; callus  $\frac{1}{1+\frac{1}{12}}$  in.; awn of II as long as itself or shorter; III shorter than II, narrow, obtuse, 2-nerved, ciliate; IV the linear hyaline 3-nerved base of the awn. Pedwelled spikelets pale, shining, pedicels very shortly rufous-villous on both margins, excised at the tip in a semicircle; gl. I thin, tip 2-toothed, nerves strong subequidistant, or the 3 lateral on each side submarginal, margins narrowly incurved, keels ciliolate from base to tip; II lanceolate, acuminate, 3-nerved, ciliolate; III linear-oblong, 2-nerved, ciliate; IV narrowly lanceolate, 1-nerved.—I have seen only two specimens of this plant, that in Herb Wallich, and another sent by Heyne to Rottler named A. asperum in his own handwriting. Very closely allied to A. verticullatus, but differing totally in habit and foliage according to Roxburgh's drawing and description of that plant, and coming from a very different part of India.
- 46. A. lancearius, Hook. f.; stem tall leafy, leaves narrowly lanceolate acuminate narrowed towards the base quite glabrous flat smooth midrib beneath quite smooth, sheaths imbricate compressed, panicle narrow of many whorls of short simple smooth erect branches bearing solitary erect spikes, sessile spikelets  $\frac{1}{4}$  in., callus short glabrous in front, gl. I glabrous or minutely ciliate at the strongly compressed tip, II keel and sides above the middle more or less hispid, awn of IV  $1\frac{3}{4}$  in., pedicelled spikelets  $\frac{1}{3}$  in. narrowly lanceolate 7-nerved keels eccliate except at the tip.

SIKKIM HIMALAYA; at the foot of the hills, Punkabaree, Kurz. Chota Nagpore;

Ramghur, Ghat, 1750 ft., Clurke.

Stem 2-3 ft. or more, leafy upwards. Leaves 12-14 by  $\frac{1}{3}-\frac{1}{2}$  in, rather thin, narrowed from below the middle to the base, quite smooth on both surfaces, midrib broad white above, nerves many very slender, margins minutely spinulose; sheaths keeled, quite glabrous; ligule a row of very fine short hairs. Panacle 6 in., quite like that of A. asper, from which this plant differs in the leaves, in the callus glabrous in front, in the much more hairy gl. II of the sessile spikelet, and in the eciliate keels of gl I of the pedicelled spikelets.—The Chota Nagpore specimen has been named A. verticillatus by Hackel in a letter to Mr. Clarke, from which it differs in the form of the panicle and glabrous leaves; its gl. IV of the pedicelled spikelets is 2-fid, but that of the Sikkim plant is lanceolate and aristately acuminate. I have examined a specimen of what may prove to be a form of this plant collected at Gya in Behar (Herb. Hort. Calcutt.) in which gls. II and IV of the pedicelled spikelets are both awned, the awn of the latter (IV) being sometimes as fully developed as that of the sessile spikelet! The specimen is in too imperfect a condition to be described fully: the gl. I of the pedicelled spikelet is quite glabrous with a 2-toothed tip. In all other respects it agrees with A. lancearus.

47. A. Hamiltoni, Hook. f.; tall, stout, leaves very long linear gradually acuminate smooth above scaberulous beneath margins nearly smooth, panicle large ovoid dense of many long smooth erect branches in many closely approximate whorls each bearing 1-3 spikelets, spikes erect, seessle spikelets \(\frac{1}{2}\) in, callus very short villous all round, gl. I minutely hispid at the strongly compressed tip, II keel ciliate close under the long awn, awn of gl. IV 2\(\frac{1}{2}\) in, pedicelled spikelets \(\frac{1}{2}\) in. linear-lanceolate, gl. I 7-9-nerved ciliate close to the tip only. Holcus Carar, Ham. in Wall. Cat. n. 8792 A.—Chrysopogon, Wall. Cat. l. c.

BEHAR; Monghir, Hamilton.

Stem several feet high, stout, terete, leafy, quite smooth. Leaves 12 ft. or more by \(\frac{1}{4}\)-\(\frac{1}{2}\) in., flat, rather thin, many-nerved, beneath and midrib quite smooth, base rather contracted; sheath terete, smooth, glabrous; ligule a ridge of minute hairs. Panicle 6 by 21 in., peduncle stout as thick as a duck's quill; rachis stout, terete; branches very unequal, longest 2-3 in., each with usually 2-3 spikes. Sessile spikelets, callus  $\frac{1}{30}$  in.; gl. I 4-nerved, polished; II 2-lobed, awn as long as itself, margins not ciliate; III oblong, obtuse, hyaline, 2-nerved; III the linear hyaline 3-nerved eciliate base of the awn. Pedicelled spikelets pale green, pedicels sparsely villous on the margins and back with short rufous hairs, unequal, 1 and 1 shorter than the sessile spikelet; gl. I narrowed into an awn often as long as itself, lateral 3 nerves on each side submarginal; II and III lanceolate, acuminate, retrorsely ciliate, II 3-nerved, III 2-nerved.—The specimen in Herb. Wallich consists of a portion of a stem a foot long, a panicle fully emerged from a leaf-sheath, with suberect branches which will probably spread later on, and several leaves. Another in Hamilton's Herbarium (now at Edinburgh) corresponds precisely. It is nearly related to asper, but a very robust tall plant, the branches of the panicle are much more numerous and longer, the leaves glabrous and not spinulosely margined, the spikelets much larger, the callus shorter, and the margins of gl. II of the sessile spikelet eciliate. It may prove to be a form of A. verticillatus.

- §§ Glumes I and II of pedicelled spikelets both awned.
- 48. A. Wightianus, Steud. Syn. Gram. 395; leaves linear acute glabrous or pubescent spinulosely serrulate, lower sheaths compressed, rachis and branches of panicle minutely hairy, sessile spikelets \(\frac{1}{2}\) in., callus long densely bearded all round, gl. I laterally compressed above, minutely truncate glabrous below hispid above. II long-awned hispid above on the keel and sides, awn of IV 2-2\(\frac{1}{2}\) in., pedicelled spikelets lanceolate pubescent much longer than the sessile. A. aristulatus, Hochst ex Steud. Syn. Gram. 397; Hack. Monogr. Androp. 556. A breviaristatus, Steud. l. c. 396. Chrysopogon Esenbeckii, Wight Cat. n. 1805 (non Steud.). C. Wightianus, Nees ex Steud. l. c; Wight Cat. n. 1876, Herb. 3398. Rhaphis orientalis, Desv. Opusc. 69. R. Wightianus, Nees ex Steud. l. c.—Chrysopogon, Wall. Cat. n. 8785 C. D.

MADRAS, Wight, Griffith, &c. NILGHIRI HILLS, Schmid, Kuntze. BURMA,

Kuntze (Hackel) .- DISTRIB. Anam.

- Variable in habit; stems short or tall, erect or ascending from a short stout creeping stock. Leaves 3-10 in., rigid, from glabrous to pubescent on both surfaces and with sometimes tubercle-based hairs; sheath glabrous; ligule very short, villous. Panicle 3-5 in., contracted, lower branches long, few in a whorl. Spikes solitary, green or brownish. Sessile spikelets subcylindric; callus long, hairs rusty; gl. I obscurely 4-nerved, tip 2-dentate; II chartaceous, tip 2-lobed, awn as long as the gl or shorter; III linear-oblong, 2-nerved, ciliate; IV awn with a narrowly dilated 2-lobed base, column hispid. Pedicelled spikelets nearly \( \frac{1}{2} \) in.; pedicel truncate, margins shortly villous; gl. I glabrous or pubescent, 7-nerved, awn longer than the gl., keels ciliate; IV very narrow, ciliate, nerveless.—I have seen no Ceylon specimen of this species; Thwaites' C.P.n. 3248 in Herb. Kew, is a starved specimen of A. zeylanucus. Nor have I seen Burmese or Anam ones.
- 49. A. distichopyllus, Hook. f.; stem stout fastigiately branched, leaves distichous erecto-patent narrowly linear rigid smooth, sheaths terete, panicle very long-peduncled narrow, branches very unequal erect smooth with one terminal spike, sessile spikelets \(\frac{1}{3}\) in. callus elongate shortly villous all round, gl. I 2-cuspidate quite glabrous, II glabrous, awn of gl. IV  $2\frac{1}{2}$  in., pedicelled spikelets longer than the sessile lanceolate, gl. I glabrous 7-nerved keels ciliate at the tip only.

SOUTHERN BURMA; on the coast at Kobok, Kurz.

A perennial, apparently of bushy habit several feet high, branches rigid terete glabrous. Leaves 4-6 by  $\frac{1}{10}$ — $\frac{1}{3}$  in., structe, complicate, subpungent, margins smooth, ciliate towards the base; sheath appressed, smooth. Pancle 5-6 in.; peduncle 12 in.; rachis slender, smooth; branches strict, in distant fascicles rather than whorls, tips very oblique with erect beards; lower 1 in. long, rarely with 2 distant spikes. Sessile spikelets very narrow; callus  $\frac{1}{3}$  in.; gl. I 4-nerved; II narrow, complicate, 3-nerved, tip 2-lobed, awn as long as itself; III linear-oblong, obtuse, ciliate; IV the very narrow hyaline 3-nerved base of the awn. Pedicelled spikelets nearly  $\frac{1}{3}$  in.; pedicels  $\frac{1}{3}$  shorter than the sessile spikelet, tip retuse, margins ciliate; gl. II 3-nerved, ciliate, shortly awned; III as in the sessile spikelet; IV 0.—I have seen but one specimen of this very distinct-looking plant.

§§§ Glume I of pedicelled spikelets not awned, II not or very shortly awned.

50. A. zeylanicus, Nees ex Steud. Syn. Gram. 397; leaves very long and narrow, panicle ovate-oblong, branches in tew whorls spreading with 1-3 terminal spikes, rachis scaberulous, sessile spikelets  $\frac{1}{6}$  in., callus long naked in front, gl. I not laterally compressed above, dorsally with 2 rows of cilia or spinules above the middle tip truncate, awn of gl. IV  $\frac{3}{4}-l\frac{1}{4}$  in., pedicelled spikelets much longer than the sessile lanceolate 5-nerved glabrous keels ecihate. A. nodulibarbis, Hochst. ex Steud Syn. Gram. 396; Hack. Monogr. Androp. 553. A. peninsulæ, Steud. l. c. Chrysopogon Arnottianus, Nees ex Steud. l. c. 396. C. Wightianus, Thw Enum. Pl. Zeyl. 366 (C.P. 3248) (exl. var.  $\beta$ ); Trim. Cat. Ceyl. Pl 108 (non Nees). C. zeylanicus, Thw. lc. (C.P. 996) (non Steud.). Rhaphis zeylanica, Nees ex Steud. l. c.—Chrysopogon, Wall. Cat. n. 8785 A. B.

NILGHIRI HILLS, alt. 7-8000 ft., Wight, &c. CEYLON, ascending to 6000 ft., Walker, &c.

Stems 1-3 ft., tufted, stout or slender. Leaves many from the base of the stem, 12-16 by  $\frac{1}{70} - \frac{1}{6}$  in, flexuous, rather cornaceous, margins more or less laxly culiate with rather long hairs; lower sheaths short, flattened, keeled; ligule of short hairs. Panicle 5-8 in, contracted or effuse, with long naked unequal lower branches. Spikes green or blueish. Sessile spikelets, callus  $\frac{1}{10}$  in., hairs yellow or rusty brown; gl. I coriaceous, tip ciliate, often 2-toothed; nerves 2 pairs, obscure; II 3-nerved, tip 2-lobed, keel spinulosely ciliate above the middle; III oblong, obtuse, 2-nerved, retrorsely ciliate; IV the very narrow sub-2-lobed, 3-nerved, eciliate dilatation of the base of the awn Pedicelled spikelets \( \frac{1}{2} \) in.; pedicels truncate, margins shortly densely or laxly ciliate on one or both margins; gl. I narrowly lanceolate, keels minutely ciliate, nerves subequidistant or the lateral pairs submarginal; II acuminate, 3-nerved, retrorsely ciliate; IV smaller, ovate-lanceolate, 1-3-nerved, ciliate,

- \*\* Pedicel of upper spikelets not half as long as the sessile spikelets.
- 51. A. monticola, Schult. Mant. iii. 665; stem erect or ascending usually very slender, leaves very narrow glabrous, lower sheaths compressed, panicles rather short of several whorls of few or many capillary flexuous very unequal branches bearing solitary spikes, sessile spikelets pale, callus short, gl. I compressed glabrous or keel ciliate above the middle, II dorsally more or less ciliate with short or long rigid bristles, awn of IV  $\frac{1}{2}$ -1 in. capillary, pedicelled spikelets lanceolate awned or not 7-nerved, pedicels  $=\frac{1}{4}$ - $\frac{1}{3}$  the sessile spikelet margins more or less villous.

WESTERN HIMALAYA, from Kashmir to Nepal, ascending to 6000 ft. Hilly

districts, from the PANJAB to BEHAR and southwd. to CEYLON. BURMA,

Collett - DISTRIB Affghanistan, S. Africa.

Stems tufted, 1-3 ft., simple or branched, usually almost filiform, rarely as thick as a crow-quill or stouter. Leaves 6-18 in., rarely more than in. broad, finely acuminate, quite smooth above and beneath, margins minutely scaberulous; upper sheaths terete, lower more or less compressed, sometimes very much so and membranous. Pancle 2-4 in., rarely more; raches flexuous; branches in whorls of 3-12, rarely more, smooth or scaberulous, lowest \(\frac{1}{2}-1\) in. or more, upper shorter; all quite smooth, or in the lower part together with the rachis scaberulous, rarely scaberulous throughout. Spikes very variable in size; the green blue and purplish or brown pedicelled always longer than the pale sessile. Sessile spikelets 1-1 in.; callus hairs short or long, from white to rusty red; gl. I narrow, strongly compressed, margins membranous, tip rounded; II broader, tip 2-fid, with a short recurved awn, keel obtuse from glabrous to hirsute for a greater or less part of its length, with rigid or flexuous rufous or white bristles, margins membranous hardly ciliate; III hyaline, oblong, obtuse, ciliate; IV the long narrow hyaline 3-nerved eculate dilatation of the awn. Pedicelled spikelets 1-3 in., neuter or male, from ovate- to linear-lanceolate, acuminate; pedicels cuneate, margins sparsely or densely villous, the upper hairs in some of the most densely villous nearly equalling the spikelet from dark rusty red to white; gl. I thin, acute acuminate or awned, the awn equalling or shorter than the gl., glabrous or pubescent; nerves always 7, subequidistant, or 2 on each side sub-carinal; margins narrowly incurved, spinulosely ciliate or smooth; II lanceolate, acuminate, ciliate; III hyaline, oblong, obtuse, 2-nerved or nerveless; IV shorter, narrower, hyaline, 1-3-nerved .- I am unable to classify the varieties of this common and variable plant in accordance with geographical areas or other considerations. This, if possible, must be effected by field botanists in India. There is every gradation from the coarsely hirsute keel of monticola, to the perfectly smooth of some states of Trini; from the awnless to long awned gl. I of the pedicelled spikelets, and from the glabrous to the pubescent of the same organ; the colour of which affords no character, nor does its length, or that of the cilia on its keels.

Var. monticola proper; gl. II of sessile spikelet villous for more or less of its length with long flexuous usually rufous rigid bristles. A. monticola, Schultes l.c. Kunth Enum. Pl. i. 506; Steud. Syn. Gram. 395; Hack. Monogr. Androp. 557 (eacl. var. villosus). A. aciculatus, Herb. Wight ew Wall. Cat. n. 8782 B. A. montanus, Koen. in Herb. Banks. A. Sprengelii, Kunth Revis. Gram. 166. Chrysopogon montanus, Trin. in Spreng. N. Enideck. ii. 98; Trim. Cat. Ceyl. Pl. 108. Pollinia fulva, Spreng. Pugill. ii. 98.—Chrysopogon, Wall. Cat. n. 8782.

Var. Trinii; gl. II of sessile spikelets glabrous or shortly ciliate, hairs of callus and pedicels often very pale reddish or white. A. Trinii, Steud. Syn. Gram. 395; Hack. Monogr. Androp. 558. A. ciliolatus, cogrulens, and increscens, Steud. L.c. Chrysopogon ciliolatus, Boiss. Fl. Orient. v. 458 (ewcl. var. 3.); Duthie Grass. N. W. Ind. 22. C. cogruleus, Duthie l. c. 23, Fodd. Grass. N. Ind. 39, t. 60. C. increscens, Nees ew Steud. L.c. 396. C. Wightianus, var. leucanthus, Thw. Enum. Pl. Zeyl. 366; Trim. Cat. Ceyl. Pl. 108. C. serrulatus, Trin. in Mem. Acad. Petersb. Ser. VI. ii. (1833) 318, Sp. Gram. Ic. t. 331; Duthie l. c. Rhaphia ciliolata and cogrulea, Nees ew Steud. l. c. 396, 395.—Chrysopogon, Wall. Cat. n. 8788, 8791.

Var. robustus, stem tall stout 2-4 ft. and upwards, as thick as a goose-quill below, leaves 8-10 by \(\frac{1}{2}\) in., rather corneceous, tapering from the base to the tip, scaberulous above, glaucous beneath; upper sheath \(\frac{1}{2}\)-6 in. loose, terete keeled, panicle 6 in., sessile spikelets \(\frac{1}{2}\) in. keel of gl. II hispidly ciliate from base to apex, awn of gl. IV 1\(\frac{1}{2}\) in., pedicelled spikelets \(\frac{1}{2}\)-\(\frac{1}{2}\) in. lanceolate awned, gl. I awned dorsally pubescent, keels ciliate. Chrysopogon serrulatus, Herb. Strach. \(\frac{1}{2}\) Winterb.—Central India, Goona (Herb. Hort. Calcutt.) Kumaon, alt. 5500 ft. Strachey \(\frac{1}{2}\)\*

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52. A. Hackelii, Hook. f.; stem tall stout, leaves narrow finely acuminate, paniele oblong, rachis strict, branches smooth crowded in many superposed whorls short very unequal smooth spreading simple each with a solitary spike, sessile spikelets  $\frac{1}{0}$  in golden yellow, callus very short beard fulvous brown, gl. I obtuse glabrous, II glabrous awned, awn of IV  $\frac{3}{4}$ -1 in., pedicelled spikelets rather shorter than the sessile, gl. I oblong acute quite glabrous 5-7-nerved not awned keel eciliate, II shortly awned.—Chrysopogon, Wall. Cat. n. 8783. Wight Herb. n. 1030 (in Herb. Kew).

TRAVANCORE, Wight. NILGHIEI HILLS; Gondaloo Ghat, alt. 4500 ft . Lawson. Stem 4-5 ft., or more, as thick as a goose-quill below, leafy, quite smooth. branching upward, branches erect. Leaves 2-3 ft., by 1/6-1/4 in, coriaceous, smooth, pale glaucous green, striate, margins sub-scaberulous; sheath subterete, keeled, smooth, glabrous; ligule a ridge of hairs. Panicle 4-6 in.; branches in 6-10 whorls, \frac{1}{3} in apart, the longest about 1 in. long, rather stiff, tips hardly oblique, beard of spreading rufous hairs Spikes solitary. Sessile spikelets yellow; gl. I 4-nerved, polished; II subcymbiform, tip 2-lobed, 3-nerved, margins ciliolate, keel rounded and thickened, awn shorter than the gl.; III linear-oblong, obtuse, hyaline, ciliate, nerveless, IV very narrow, 1-3-nerved, hyaline, base and column of awn brown. Pedicelled spikelets pale green; vellow or purplish, male, pedicels =  $\frac{1}{3}$  nearly  $\frac{1}{3}$  the sessile spikelets truncate, margins densely villous with long rufous hairs, the upper of which = half the spikelets, gl. I thin, nerves subequidistant, or 2-3-nate pairs submarginal margins narrowly incurved; II lanceolate, 3-nerved ciliate; III oblong, 2-nerved, ciliate; IV narrowly lanceolate, 1-nerved ciliate.—A very handsome plant with a bright golden panicle. Wight's n. 1030 (which is not a catalogue number) is referred by Hackel to A. Trinn var. increscens, with the locality Courtallam, taken from Steudel It differs from the n. 1030 in Herb. Kew in the villous sheaths with tubercle-based hairs, the leaves hairy on both surfaces and panicle branches 4-8, and is no doubt rightly referred to Truni.

53. A. velutinus, Hook. f.; stem not tall compressed, leaves linear broad flat acuminate puberulous on both surfaces, sheaths strongly compressed keeled, panicle with flexuous rachis and short flexuous scaberulous branches minutely bearded at the truncate tips, sessile spikelets pale, callus very short rufous bearded, gl. I compressed keel ciliolate above the middle, keel of II hirsute, awn of IV 1 in., pedicelled spikelets oblong truncate strongly 7-nerved not awned keels ciliate dorsally glabrous or hirsute, pedicels very short. Chrysopogon velutinus, Arnott in Herb. Wight n. 2314.

MYSORE; at Cuddapah, Wight.

Stems 18 in. high, rather stout, soft, tufted, leafy from the base. Leaves 6-10 by \(\frac{1}{2}\)-\frac{1}{2}\) in., distichous, flaccid, 5-9-nerved, slender midrib beneath and margins spinulosely ciliolate and with a few long hairs at the base; lower sheaths equitant, \(\frac{1}{2}\) in. broad, strongly compressed and keeled, keel spinulosely ciliate, upper sheaths finely pubescent. Panele (imperfect) 2\(\frac{1}{2}\) in., branches \(\frac{1}{2}\)-l in. Sessilve spikelets \(\frac{1}{2}\) in., pale yellow; gl. I with minutely ciliolate margins; II margins eciliate, gls. III and IV in both sessile and pedicelled spikelets as in \(\textit{A}\). monticola.—I have seen only one specimen of this plant which differs widely in habit and foliage from any form of \(\textit{A}\). monticola, in the broad flat flaccid pubescent leaves and sheaths. It is a native of a botanically unexplored district.

54. A. polyphyllus, Hack. mss. in Herb. Duthie; stem simple or fastigiately branched quite glabrous, leaves many long narrow rigid acuminate flat pale glaucous-green glabrous coriaceous, sheaths terete,

panicle oblong subsecund dense-fid. very pale, branches many short in many closely approximate whorls smooth, sessile spikelets  $\frac{1}{6}$  in., callus long obtuse bearded at the very base only with long fulvous hairs, gl. I obtuse glabrous, keel ciliate towards the tip, II not awned keel glabrous or ciliate, awn of IV  $\frac{1}{6}$  in. nearly straight pale, pedicelled spikelets narrowly lanceolate acuminate glabrous 7-nerved eciliate not awned, pedicels naked villous at the tip only. A. Aucheri, var. polyphyllus, Hack. in Herb. Duthie.

CENTRAL PROVINCES; Khandua, Chanda, and Jubbulpore districts, by the

Nerbudda and Indravati rivers, &c., Duthie.

Stem 2-3 ft., stiff, as thick as a crow-quill or more. Leaves crowded, or not, 6-10 by  $\frac{1}{13}-\frac{1}{6}$  in., pale glaucous-green and smooth on both surfaces, midrib and nerves very slender, margins muutely scaberulous; sheaths appressed, hard. Panicle 4-5 in.; branches  $\frac{1}{4}-\frac{1}{2}$  in., very unequal; peduncle slender, quite glabrous. Spikes drooping, white or pale purplish. Glumes as in A. monticola. Peducelled spikelets rather longer than the seasile; peducels = about  $\frac{1}{4}$ ? the sessile spikelets.—Habit, foliage and secund panicle very unlike A. monticola, and remarkable for the stout naked callus about  $\frac{1}{16}$  in. long with a long-bearded base, and the naked pedicels villous at the tip only with erect fulvous hairs half as long as the spikelets. It differs from Aucheri, in the tall habit, long-glabrous glaucous foliage, glabrous peduncle and branches of the panicle, callus, peducels, awnless pedicelled spikelets, and the very short awn of gl. IV of the sessile spikelets.

55. A. Aucheri, Boiss. Diagn. Ser. I. v. 7; densely tufted, basal sheaths silky, leaves short linear pubescent, sheaths terete very pale silky peduncle pubescent below the oblong panicle, branches in approximate whorls short very unequal scaberulous, sessile spikelets  $\frac{1}{6} - \frac{1}{6}$  in callus long villous all over with long pale silky hairs, gl. I glabrous or keel and tip ciliate, keel of II hirsute, awn of IV  $\frac{2}{3}$ -1 in pale, pedicelled spikelets longer than the sessile narrowly lanceolate 5-7-nerved, keels ciliate and with a long ciliate awn, pedicels =  $\frac{1}{3}$  the sessile spikelet silkily villous. A. Aucheri, a. genuinus,  $Hack\ Monogr.\ Androp.\ 560.$  Chrysopogon ciliolatus  $\beta$ . Aucheri,  $Boiss.\ Fl.\ Orient.\ v.\ 458.$ 

SCIND; near Kurrachee, Stocks .- DISTRIB. Affghanistan, N. Africa.

Stem 6–18 in , simple or sparingly branched, base thickened, leafy. Leaves 2-4 by \(\frac{1}{10-\frac{1}{6}}\) in., sometimes undulate, acute or acuminate, pale green, often ciliate towards the base, margins scaberulous; sheath very pale. Panicle 2-3 in., erect, long-peduncled, rachis scabrid. Spikes usually crowded, rarely binate on a branch. Sessile spikelets; callus obtuse; gl. I compressed, with sometimes long terminal bristles; II awned or not, awn hirsately ciliate; III and IV as in A. monticola. Pedicelled spikelets \(\frac{1}{2}-\frac{1}{4}\) in., pedicels silkily villous from base to apex; gl. I sparsely ciliate dorsally, and with very long cilia on the keels towards the tip, awn pale hirsate.—I have confined the description to the Scind plants. Hackel describes the species, which extends to Persia, Arabia, Morocco, and S. Africa as extraordinarily variable, no two specimens agreeing in all points, and the spikelets varying in the same specimen. These remarks would probably apply to all the allied species of Chysopogon, in whose stability I have no confidence.

Subgen. IX. DICHANTHIUM, Hack. Spikes digitate, rarely solitary or panicled, subsessile or stipitate on the peduncle, joints many and pedicels linear filiform dorsally flat compressed; lower 1-4 pairs of spikelets homogamous (except sometimes in A. annulatus) male or neuter. Sessile spikelets dorsally compressed; gl. I with the margins usually inflexed and

keeled above and involute or not below; II keeled, awnless; III hyaline; IV a naked awn, its base rarely narrowly hyaline, or 2-fid and awned in the cleft. Pedicelled spikelets like the sessile, but male or neuter, awnless.

- \* Glume IV of sessile spikelets a simple awn, acute at the base.
- 56. A. caricosus, Linn Sp. Pl. Ed ii. 1480 (excl Syn. Rumph.); stem erect or decumbent below, leaves narrowly linear, sheaths compressed, spikes 1-4 in. solitary binate or subdigitately panicled, spikelets closely subdistichously imbricate, joints and pedicels  $\frac{2}{3}$  shorter than the sessile spikelets  $\frac{1}{5}$ - $\frac{1}{5}$  in., gl. I of sessile spikelets obovate or oblong tip truncate denticulate dorsally more or less villous, keels with ciliate wings, II obtuse 3-nerved, III ovate-oblong ciliate. Hack. Monogr. Androp. 756.

Plains and low hills of India, from Scind to Burma and the Andaman Islds. (not in N W. India) and southwd. to CEYLON.—DISTRIB. Mauritius, China.

Stem 1-2 ft, erect or ascending from a creeping base, often much branched, stout or slender, even capillary, grooved on one side, leafy; nodes bearded or not. Leaves 6-8 by \(\frac{1}{1}\), \(\frac{1}{1}\) in., finely acuminate, glabrous or ciliate, margins scabrons, sheaths smooth; ligule membranous \(Spikes\) inclined, often flexuous, \(\frac{1}{2}\)-\(\frac{1}{1}\) in. broad, silvery, lower sometimes stipitate; joints and pedicels = \(\frac{1}{2}\) the spikelet, ciliate on one margin; callus short, broad. Sessile spikelets 5-7-nerved, margins gl. I broadly incurved below, narrowly above; II narrow, 3-nerved, apiculate, margins ciliate, keel scaberulous; III ovate-oblong, hyaline, nerveless; IV awn \(\frac{3}{2}\)-1 in., column scabrid. \(Pedicelled \) spikelets smaller than the sessile; gl. I broadly oblong, sikily ciliate; II ovate-lanceolate, acute, ciliate.—A very variable grass, of which there are two principal forms.

Var. genuinus, Hack.; stem glabrous below the usually solitary spike, gl. I smooth above hairy towards the base. A. caricosus, Linn.; Trim Cat. Ceyl Pl. 108. A. binatus & tenellus, Rorb. Fl. Ind. i. 254, 235; Steud. Syn Gram. 372, 371. A. filiformis, Pers. Syn. i. 103 A. serritus, Retz. Obs. v 21; Trin. Sp. Gram. Ic t. 329; Rorb Fl. Ind. 253; Steud. l c 366 Lepeocercis serrata, Trin. Fundam. Agrost. 203; Wight Cat n. 1687, Herb. Prop. n. 1687. Heteropogon concinnus, Thio. Enum Pl. Zeyl. 368.

Var. mollicomus, Hack.; stem pubescent below the spikes, gl. I 3-toothed dorsally hany all over. A. australis, Poir. Encycl. Suppl. i. 585 A. barbatus & pertneus, Herb Ham. ex Wall ('at. n. 8809 B C. A curvatus, Herb. Russ ex Wall Cat. n. 8809 A. A. incurvatus, Kæn. ex Trin. in Spreng Entdeck. ii. 91. A. Kenigii, Steud. Syn. Gram. 381 A. mollicomus, Kunth Revis. Gram. i. 365, Enum. Pl. i. 497. Lepeocercis digitatus, Royle Ill. Bot. Himal. 416. Dichanthium nodosum, Uteri Annal. xvii. (1796) 11. Diplasanthera lanosum, Desv. Opusc. 67, t. 5, f. 1.—Andropogon, Wall ('at. n. 8809, 8810 F. H. Wight Cat. n. 1687.

57. A. annulatus, Forsk. Fl. Æg. Arab. 173; densely tufted, leaves narrowly linear, sheaths terete, spikes subdigitately fascicled, peduncles glabrous, joints and pedicels slender laxly ciliate, sessile spikelets \$\frac{1}{8}-\frac{1}{6}\$ in., gl. I oblong obtuse or truncate flat or convex 5-9-nerved keels ciliate above not winged glabrous or more or less villous with long spreading hairs, II acute, keel smooth except below, III oblong obtuse glabrous. Del Fl Egypt. iii. t. 7, f. 2; Kunth Enum. Pl. i. 498 (excl. Syn.); Stend. Syn. Gram. 380; Hack. Monogr. Androp. 570; Wight Cat. n. 1697; Aitchis Cat. Panjab. Pl. 175; Duthie Fodd. Grass. N. Ind. 33, t. 20; Benth. Fl. Austral. vii. 531; Boiss. Fl. Orient. v. 463. A. Bladhii, Retz. Obs. ii. 27; Kunth l. c. 498; Trin. Sp. Gram. Ic. t. 325; Rowb. Fl. Ind. i. 259; Wight Cat. n. 1698, Aitchis. l. c.; Duthie Grass. N. W. Ind. 19. A. comosus, Link Enum. Hort. Berol. i. 239. A. garipensis, Steud. l. c. 379. A. Ischæmum, Roxb. ex Wight Cat. n. 1697. A. obtusus, Nees

in Hook. & Arn. Bot. Beech. Voy. 243 (excl. Syn. Roxb.). A. scandens, Roxb. l. c. 258, Kunth l. c. 498; Grah. Cat. Bomb. Pl. 238; Dalz. & Gibs. Bomb. Fl. 301; Duthie l. c. 21. Lepeocercis annulata, Nees Fl. Afr. Austr. 98.—Andiopogon, Wall. Cat. n. 8810 C E. G.

Throughout the hills and plains of India, from Kashmir westward to Bengal and southward (not in Ceylon).—Distrib. Trop. Africa, China, Australia, Pacific.

Stems usually woody at the base with strong wiry roots and tufted leaves, then geniculately ascending, 6-36 in; nodes bearded or not. Leaves 3-12 in., rigid, glaucous, glabious or hairy above with tubercle-based hairs, margins scabild; sheath bearded at the tip; ligule oblong, obtuse. Spikes 1-2; in., straight or flexuous, usually inclined, pinkish or nearly white, joints and pedicels = ½ the spikelets, slender, rigid, margins shortly citate. Spikelets very variable in size, closely imbricating; callus shortly bearded; gl. I thin, nerves strong or faint, not reaching the tip; II lanceolate, 3-nerved, glabrous or citiolate; III narrow, glabrous; IV awn ½-1 in., column scabild. Pedicelled spikelets about = the sessile; gl. I obtuse or acute, 7-11-nerved, keels bristly; II narrower, 3-nerved; III cihate; IV minute or 0.— A very common Indiau grass, of which Hackel distinguishes three Indian varieties, to which I have added a fourth.—

Van. genumus; spikes 3-10, gl. I of sessile spikelets beset with rigid tubercle-

based hairs, of pedicelled doisally hairy all over.

Var. decalvatus; gl. I of sessile spikelets glabrous, of pedicelled often papillose Var. Bladhu; spikes many, lower long-stipitate, gl. I of sessile spikelets glabrous

or loosely harry.

Var. papillosus; spikes 3-8 decurved, gl. I of sessile spikelets with a transverse row of tubercle-based hairs below the tip. A. papillosus, Hochst. ex A. Rich. Tent. Fl. Abyss n. 457; Hach. l c. 573.—Behai on Parusnath, Clarke—Afr. trop.

58. A. Clarkei, Hack. in Esterr Bot. Zertschr. xli. (1891) 49; annual, very slender, much branched, leaves 2-4 in. linear-lanceolate, spikes solitary on capillary peduncles from spathiform sheaths, joints and peducels slender silkily villous sulcate, spikelets subdistichous, sessile silkily villous with white hairs, gl. I elliptic-oblong flat truncate 2-toothed, keels scaberulous, IV a simple awn, gl. I of pedicelled spikelets rather larger narrower red-brown glabrous.

BEHAR; on Parusnath, alt. 4200 ft., Clarke.

Stems 12-18 in., leafy, nodes bearded. Leaves flat, finely acuminate, base contracted, quite smooth, nerves very slender; sheaths long, slightly tunid, mouth contracted; ligule of hars. Spikes \(^2\_3\)-1 in. long, flattened, joints and pedicels sulcate, slender. Spikelets 6-8 pairs; two lowest pairs neuter. Sessile spikelets \(^1\_3\) in.; callus very short; gl. I thinly chartaceous, 7-nerved, margins narrowly inflexed; II narrowly cymbiform, acuminate, 3-nerved, margins cluate; III oblong, obtuse, hyaline, chate; IV the slender awn \(^1\_2\)-1 in. long. Pedicelled spikelets \(^1\_3\) in., dark brown; gl. I obtuse or emarginate, many-nerved; II 3-nerved; III smaller.—The white sessile and dark pedicelled spikelets are a marked feature.

59. A. armatus, Hook. f.; annual, tufted, erect, leaves linear copiously hairy, spikes 2-5 subdigitate long-peduncied, joints and pedicels slender not grooved, spikelets 10-20 pairs, gl I of sessile oblong obtuse sometimes alveolate dorsally densely silky below the middle keels ciliate, IV a simple awn, gl. I of pedicelled spikelet armed with spreading submarginal tubercle-based bristles twice or thrice its own length.

The CONCAN, Stocks,

Stems 12-18 in., as thick as a sparrow's quill, simple or branched above; nodes bearded. Leaves 4-6 by  $\frac{1}{6}-\frac{1}{4}$  in., flaccid, nerves slender, base rather contracted, softly hairy on both surfaces and with long tubercle-based bristles at the base;

sheaths lax, upper smooth pale spathiform; ligule 0. Spiles \(\frac{1}{2}-\frac{1}{2}\) in., flexuous, nodding or cernuous silvery-green, lowest pairs of spikelets male; peduncles \( \frac{1}{3} \) in., capillary, axils with whorls of long white hairs; rachis and pedicels slender, terete, silkily ciliate, upper hairs long. Sessile spikelets in.; callus very short, silkily bearded, gl. I thin, pale, nerveless, with often a large deep dorsal pit, margins narrowly incurved; II acute, nerveless, dorsally silkily villous; III oblong or linear, flat, hyaline, obtuse, nerveless; IV, awn about 1 in., slender, nearly smooth, base acate. Pedicelled spikelets 1 in. rather narrower than the sessile; gl. I slightly convex, quite smooth between the bristles, keels ciliate, many-nerved; II ovateoblong, 3-nerved, ciliate; III oblong, obtuse, eciliate; IV very narrow.

60. A. mucronatus, Anderss. ex Hack. Monogr. Androp. 577; stem tall stout, internodes alternately flattened, sheaths terete, leaves linearlanceolate acuminate pubescent, spikes 5-10 flabellately panicled, sessile spikelets in twice as long as the joints and ciliate pedicels, callus hairs half as long as the glumes, gl. I coriaceous obovate-lanceolate obtuse glabrous shining 6-nerved pitted in the middle, keels setose above the middle, II as long lanceolate acute glabrous except the ciliate margin 3-nerved, IV a stout awn, gl. IV of pedicelled spikelets awned or mucronate.

INDIA? Hugel.

Stem 3-4 ft. or taller, simple, nodes 4, bearded. Leaves flat, base fimbriate; sheaths smooth; ligule rounded, ciliolate Spikes solitary or opposite, shortly peduncled, lower pair of spikelets male. Spikelets yellow-green; gl. I not hyaline at the tip; II obscurely keeled, dorsally shining; III linear-lanceolate, nerveless, ciliats; IV awn in long, stout, palea minute. Pedicelled spikelets rather longer and broader than the sessile; gl I obliquely elliptic-obling, violet-colrd., keels setosely ciliate nearly to the base, 13-nerved; II narrower, lanceolute, acute, 5nerved, ciliate; III obovate-oblong, 1-nerved, ciliate; IV as long, linear, 1-nerved, glabrous.-Description from Hackel, who says it is a peculiar species, not allied to the preceding, but rather to A. polyptychus.

# \*\* Gl. IV of sessile spikelet 2-fid, awned in the cleft.

61. A. polyptychus, Steud. Syn. Gram. 380; stem slender erect simple or branched below only, leaves erect strict softly hairy acuminate, sheaths subcompressed, spikes 4-6 digitate simple or forked, joints and ciliate pedicels half as long as the sessile spikelets, gl. I of sessile spikelets narrowly elliptic-oblong obtuse 4-7-nerved nearly flat glabrous, margins narrowly incurved, keels strongly ciliate above, II as long mucronate 3-nerved ciliate, IV very narrow with 2 setaceous or lanceolate lobes. Thwaites Enum. Pl. Zeyl 367; Trim. Cat. Ceyl. Pl. 108; Hack. Monogr. Androp. 578.

CEYLON; at Pedrotallagalla, alt. 7000 ft., Thwaites.

Stems densely tufted, 2-3 ft., as thick as a crow-quill below, smooth. Leaves 8-16 in. by 10-4 in., rigid, erect; ligule short, rigid. Spikes usually 3, very fragile, 2 m. long, shortly peduncied, joints and pedicels not furrowed; axils hairy; spikelets closely imbricate, lowest pair male or neuter. Sessile spikelets 1 in., calling very short, shortly bearded; gl. I not winged, sometimes depressed on the median line; II 3-nerved, glabrous except the margins, acute or aristulate; III oblong-lanceolate, acute, 1-nerved; IV rather shorter, nearly glabrous, awn 1 in very slender; palea minute, broadly ovate, ciliate. Pedicelled spikelets broader than the sessile; gl. I convex, many-nerved, narrowly winged on one side, tip membranous, keels ciliate; II oblong, acute, 1-nerved, ciliate; III and IV small, oblong, obtuse, 1-nerved, shortly ciliate.

62. A. nitidulus, Hook f.; annual, very slender, branched, leafy, leaves long narrow flaccid scaberulous base contracted, spikes very few very unequal on a long capillary peduncle white, rachis tenacious, sessile spikelets ovate-oblong 9-nerved dorsally flat glabrous or scabrid towards the hyaline truncate tip, keels ciliate towards the tip, II 5-7-nerved acuminate, IV short broadly 2-lobed, awn very slender.

N.W. HIMALAYA; on the Sewalik Hills; and Chanda in the CENTRAL PROVINCES, Duthre.

Stems 3-4 ft., loosely tufted, very slender from the naked base upwards, nodes glabrous. Leaves 8-12 by \(\frac{1}{2}\)-\(\frac{1}{2}\) m., acuminate, thin, margins scaberulous ciliate towards the base, midrib slender smooth, nerves very slender; sheath smooth; ligule oblong, membranous, ciliate. Spikes quite white, the terminal on the peduncle 1-1\(\frac{1}{2}\) in., lower rather distant, sessile, much shorter; peduncle 4-8 in.; jonts and pedicels = about \(\frac{1}{2}\) the sessile spikelet, very slender, ciliate with long white silky hairs, tips truncate, joints terete, pedicels flattened (almost as in Sect. Amphiliphis). Spikelets few, in rather distant pairs, homogamous pairs one or two. Sessile spikelets \(\frac{1}{2}\) in., callus very short, stellately bearded with white hairs; gl. I thin, greenish, dorsally polished, margins narrowly incurved; II chartaceous lanceolate, 5-7-nerved, margins broadly incurved, ciliate; III smaller, lanceolate, 2-nerved, ciliate; lobes of IV ovate, acute, divergent, ciliate; awn about \(\frac{1}{2}\) in , slender, column quite smooth. Anthers short. Pedicelled spikelets rather longer than the sessile, narrowly lanceolate, green, neuter; gl. I membranous, 9-nerved, glabrous, margins incurved, ciliate towards the tip only; II 7-nerved; III rudimentary or 0.

Subgen. X. Heterorogon, Hack. Spikes solitary, joints many and pedicels not channelled; lowest pairs or 2-8 pairs of spikelets closely imbricate, male or neuter. Sessile spikelets subcylindric, gl. I subcylindric or oblong, II obtusely keeled, not awned; III hyaline; IV a long awn with a stout column and often a hyaline base. Pedicelled spikelets very unlike the sessile and concealing them.

- \* Ligule membranous; column of aron hirsute; callus of sessile fem. spikelets pungent.
- 63. A. contortus, Linn. Sp. Pl. 1045; leaves scabrid above, ligule truncate ciliolate, spikes 12-3 in., sessile fem. spikelets 1 in., callus long rufous-bearded, gl. I dorsally flat, margins smooth involute, awn 3-5 in., pedicelled spikelets  $\frac{1}{8} - \frac{2}{3}$  in., gl. I obliquely lanceolate obtuse. Lamk. Encyc. t. 840; All. Fl. Pedem. 260, t 91; Kunth Enum. Pl. i. 486; Steud. Syn. Gram. 367; Hack. Monogr. Androp. 585 (excl. A. polystachyus, Roxb.); Roxb. Fl. Ind. i. 253; Grah. Cat. Bomb. Pl. 238; Dalz. & Gibs. Bomb Fl. 300; Wall. Cat. n. 8800; Wight Cat. n. 1688, 2321, in part; Baker Fl. Maurit. 444. A. Allionii, DC. Fl Franc. iii. 97. A. messanensis, Biv. Pl. ined. 5. A. Bellardi, Bub. in Nuov. Grorn. Bot. Ital. (v. 1873) 317. A. besukiensis, Steud. l.c. 307. Heteropogon Allionii. Roem. & Sch. Syst. ii. 835; T. Nees, Gen. Fl. Germ. Monocot. i. 94; Reichb. Ic. Fl. Germ. t. 53. H. contortus, Beauv. ex Roem. & Sch. l.c. 836; Benth. Fl. Austral. vii. 517; Aitchis. Cat. Panyab. Pl. 176; Duthie Grass N. W. Ind. 19, Fodd. Grass. N. Ind. 32, t. 19. H. firmus, Presl. Rel. Hænk. i. 334. H. glaber, Pers. Syn. ii. 533; Beauv. Agrost. 24, t. 23, f. 8. H. hirtus, Pers. l. c., Thw. Enum. Pl. Zeyl. 368; Trim. Cat. Ceyl. Pl. 107; Benth. Fl. Hongk. 424. H. hirsutus, Beauv. Agrost. 134. H. hispidissimus, Steud. Syn. Gram. 367. H. Hohenackeri, Hochst. ex Mrq. Anal. Bot. Ind. ii. 24. H. messanensis, Guss. Fl. Sic. Syn. i. 164. H. polystachyus, Nees Agrost. Bras.

364; Wight Cat. n 2321 (non Roxb.). H. Roxburghii, Arn. ex Nees in Nov. Act. Nat. Cur. xix. Suppl. i. (1843) 183.

Throughout India, Burma, and Ceylon to the Straits of Malacca, ascending the Himalaya to 5000 ft .- DISTRIB. Mediterranean region and tropics generally.

Stems 1-5 ft., erect or decumbent below, densely tufted, simple or fastigiately branched, compressed towards the base. Leaves 6-18 in., narrow, glabrous or hairy especially near the base, rather glaucous, rigid, margins and upper surfaces scabrid; sheaths compressed, keeled. Spikes with the lower 2-6 pairs of spikelets male with coherent joints; joints of upper (fem.) portion very short and curved callus bearded with brown hairs. Sessile (fem.) spikelets \( \frac{1}{4} \) in.; gl. I coriaceous, glabrous or hispid, many-nerved, tip membranous; II coriaceous, 8-nerved; III oblong, hyaline, embracing the long slender ovary, tip ciliate; IV awn stout, column hirsute. Pedicelled spikelets 1-1 in.; pedicel very short; gl. I lanceolate, obliquely twisted, herbaceous, keels margined or unequally winged; II membranous, acute, 3-nerved, ciliate; palea minute, ciliate. Sessile spikelets of the homogamous pairs, like the pedicelled, more or less covered with tubercle-based hairs.—Hackel has 2 varieties and 5 subvarieties (excluding polystachyus) of this widely distributed plant, founded chiefly on the number and position of the tubercle-based bristles of the male spikelet. They appear to me to be too inconstant for definition.

64. A. melanocarpus, Ell. Sketch. Bot. S. Carolin., &c., i. 146; tall, stout; leaves scabrid above, sheaths of upper with scrobiculate keels and often nerves, ligule rounded glabrous, spikes \(\frac{1}{2}\)-1 in., sessile tem. spikelets & in. terete hirsute, callus long rufous bearded, gl. I dorsally flat, awn 2-4 in., pedicelled spikelets 3-1 in. costa scrobiculate. A. polystichus, Hochst. ex Steud. Syn. Gram. 369. A. polystictus, Hochst. in Schimp. Pl. Abyss. n. 2012. A. scrobiculatus, Kunth Enum. Pl. i. 507. A. segensis, Steud. l. c. 367 (excl. cit. Wall.) Heteropogon acuminatus, Trin. in Mem. Acad. Petersb. Ser. VI. ii. (1883) 254. H. melanocarpus, Benth. in Journ. Linn Soc. xix. (1881) 71; Duthie Grass. N.W. Ind. 19. H. polystictus, Hochst. in Flora, xxxix. (1856) 28. H. Roylei, Nees ex Steud. l. c. 367. H. scrobiculatus, Fourn. ex Hack. in Mart. Fl. Bras. ii. III. 268.

UPPER GANGETIC PLAIN, Royle, &c. KUMAON, up to 5000 ft .- DISTRIB. Trop. and subtrop. Afric. and Amer.

- Stem 4-6 ft., as thick as a swan's quill below, fastigiately branched above. Leaves 1-2 ft. by 1-3 in , setaceously acuminate, rigid, green, margins scaberulous, glabrous or with long hairs at the base; sheaths compressed, glabrous, upper spathætorm, flattened. Spikes green, peduncle stout, in a narrow spathe 3-5 in. long, lower 1-3 pairs of spikelets male or neuter with coherent glabrous joints, upper pairs with fragile bearded joints. Sessile (fem. or bisexual) spikelets \(\frac{1}{8} - \frac{1}{8}\) in., callus long bearded; gl. I obscurely 9-nerved, not furrowed dorsally, margins smooth involute; II corraceous, linear-oblong 3-nerved, keel hispid; III shorter, oblong, nerveless; IV awn stout, column hirsute. Pedicelled spikelets 1-1 in., obliquely lanceolate. acuminate, pedicel very short; gl. I many-nerved, glabrous, keels ciliate-serrulate; II lanceolate, acute; III much shorter, nerveless, ciliate; IV minute, linear. Sessile spikelets of homogamons pair like the pedicelled.
- 65. A. triticeus, Br. Prodr. 201; tall, stout, leaves sparsely hairy, sheaths of upper smooth, ligule very short, spikes 3-6 in., sessile fem. spikelets 1 in. terete, callus long rufous bearded, gl. I dorsally deeply channelled silkily pubescent, awn 3-6 in., pedicelled spikelets 2-1 in. smooth. Hack. Monogr. Androp. 588; Steud. Syn. Gram. 368. A. ischynanthus & liananthus, Steud. l. c. 367. Heteropogon insignis, Thw. Enum. Pl. Zeyl. 437; Trim. Cat. Ceyl. Pl. 107; Benth. Fl, Austral. vii. 517 .-Andropogon, Wall, Cat. n. 8801.

The Concan, Stocks, Woodrow. Central Provinces; Khandwa, Duthie. Burma, at Segaen, Wallich. Ceylon; Mateke East, Thwastes.—Distrib. Malaya, Australia.

Stem 6-10 ft., as thick as a swan's quill below, hard, smooth, leafy. Leaves 1-2 ft., narrowly linear, acuminate, glaucous, above and margius scabrid; sheaths compressed, keeled, smooth; ligule ciliate. Spikes \(\frac{1}{2}\)-\]1n., very stout, green; lower 12-15 pairs of spikelets homogamous, male or neuter, joints very short. Sessile spikelets \(\frac{1}{2}\) in., cylindric, obtuse, callus long-bearded with rufous silky hairs; gl. I truncate; II obtuse; III glabrous; IV awn hirsute, very stout. Pedicelled spikelets \(\frac{3}{2}\) in., green, pedicel very short; gl. I more or less twisted, lanceolate, many-nerved, one keel winged; II linear-lanceolate, margins ciliate; III and IV hyaline, short, glabrous. Sessile spikelets of the homogamous pair like the pedicelled.

- \*\* Ligule of hairs; column of awn usually bearded; callus long.
- 66. **A. bellariensis,** Hack. in Flora (1885) 123; stem tall sheathed to the top, leaves very narrow, sheaths terete, ligule of 2 rows of hairs, spikes  $2-2\frac{1}{2}$  in. slender partially sheathed, sessile fem. spikelets  $\frac{1}{8}$  in., callus acute bearded with white hairs, gl. I linear-oblong dorsally channelled 6-nerved glabrous, awn  $1-1\frac{1}{2}$  in. base dilated and 2-toothed, pedicelled spikelets  $\frac{1}{3}$  in. glabrous. Heteropogon polystachyon, Arn. in Wight Cat. n. 2321.

The DECCAN; near Bellary, Wight (Cat. n. 2321 in part).

Stem 2 ft., ascending, branched above, terete, glabrous. Leaves 6 in. or more, by  $\frac{1}{6}-\frac{1}{6}$  in., rigid, green, quite smooth, puberulous above, setaceously acuminate; sheath glabrous. Spikes 2-3 in., slender, green, joints and pedicels shortly ciliate, shower 2-4 pairs of spikelets homogamous, male. Sessile fem. spikelets pale, callus straight pungent; gl I chartaceous, glabrous, 6-nerved margins narrowly inflexed, keels scabrid, tip entire hynline; II oblong-lanceolate, obtuse, 5-nerved, margins inflexed; III linear, nerveless, glabrous; IV awn stout, column ciliate with white hairs. Pedicelled spikelets \( \frac{1}{2} \) in., lanceolate, shortly pedicelled; gl. I lanceolate, 7-nerved, glabrous; II narrower, 5-nerved, ciliate; III and IV very narrow, glabrous. Sessile spikelet of homogamous pair like the pedicelled.

67. **A. Ritchiel**, *Hook. f.*; leaves scabrid, ligule a row of stiff bristles connate below, spikes  $\frac{3}{3}-1$  in. green, hispid, sessile tem. spikelets  $\frac{1}{3}$  in., callus short hirsute, gl. I oblong, terete rufous villous dorsally not channelled, nerves obscure, IV awn  $1\frac{1}{3}-2$  in. scabrid base acute, pedicelled spikelets  $\frac{1}{4}-\frac{1}{3}$  in. very shortly pedicelled green, gl. I narrowly lanceolate acuminate many-nerved and with a marginal series of long spreading golden tubercle-based bristles.

The DECCAN; Belgaum, Ritchie.

Stem 4-6 ft. (one only seen). Leaves 1 ft. by \( \frac{1}{3} \) in., coriaceous, linear from a narrow base, acuminate, flat, rigid, shortly harry on both surfaces hairs the tubercle-based, margins spinulosely serrulate; sheath smooth; ligule membranous? Spikes with peduncies shorter than the very narrow sheaths, stout; lower 1-2 pairs of spikelets homogamous. Sessile fem. spikelets softly villous; gl. I not channelled dorsally; II linear, 3-nerved, with a conaceous hispid centre and membranous wings; III smaller, hyaline, nerveless; IV awn slender, tortuous, red brown, column pubescent. Pedicelled spikelets male, pedicels very short glabrous, gl. I narrowly equally winged, glabrous, except for the bristles, II lanceolate, 3-nerved; IV oblong, hyaline.—I have seen only the top of a branch with a single leaf of this remarkable species. The ligule is imperfect.

68. A. oliganthus, Hochst. ex Steud. Syn. Gram. 368; dwarf, annual, leaves subensitorm acuminate softly hairy margins thickened, spikes short,

joints and pedicels about half as long as the sessile spikelet long-ciliate, sessile spikelet i in oblong, callus short obtuse, gl. I obtuse chartaceous dorsally villous toward the base not dorsally channelled shining faintly-nerved keels ciliolate towards the truncate tip, II obtuse apiculite, III very short broadly oblong ciliate, IV column of awn glabrous. Hack. Monogr. Androp. 591.

NILGHIBI HILLS; Wight, Hohenacker, &c.

Stems 3-6 in., tufted, slender, sometimes creeping below, geniculate. Leaves 2-3 in , quite flat, margins cartilaginous; sheaths compressed; ligule very short, membranous. Spikes usually very shortly exserted from the long narrow glabrous spathes, peduncle curved, puberulous. Spikes  $\frac{1}{3}$ - $\frac{3}{3}$  in. long, with 3-6 pairs of glumes, lower spikelets neuter. Gl. I of sessile spikelets with narrowly involute margins, callus bearded; awn of IV  $1\frac{1}{2}$  in. long, shining. Pedicelled spikelet larger than the sessile; gl. I obovate-oblong, obtuse, many and strongly nerved, margins ciliolate hardly incurved. II smaller, membranous, obtuse, 1-3-nerved, ciliate; palea of IV very small.—Hackel observes that this species is intermediate between Dichanthum and Heteropogou, but nearer the latter in the dorsal furrow of the sessile spikelet (which furrow I do not detect).

69. A. polystachyos, Roxb. Fl. Ind. i. 261; dwarf, erect, corymbosely branched, leaves slender short erect strict hairy, spikes ½-1 in. on slender strict naked peduncles, sessile fem. spikelets ½ in, callus densely bearded on one side with brown hairs, gl. I terete pubescent, awn 1½-2 in. base simple acute, pedicelled spikelets oblong many-nerved broadly winged glabrous. Steud. Syn. Gram. 367. A. pumilus, Roxb. Ic. ined. t. 2021 (non Fl. Ind.).

PENINSULA of India, Roxburgh, Wight.

Stem 6-10 in., slender, leafy above. Leaves 2-4 by  $\frac{1}{10}$ — $\frac{1}{48}$  in., lower flat, upper convolute, acuminate, ciliate with long flexnous hairs, margins thickened; sheaths terete, lower keeled; ligule a line of hairs. Spikes pale brown (when dry), peduncle 2-4 in., with a very slender sheath and minute leaf about the middle; 5 or 6 lowest pairs of spikes neuter. Sessile fem. spikelets dark; gl. I rigid, many-nerved; II linear, coriaceous with broad hyaline margins; III shorter, oblong, ciliate; IV awn rather slender, column shortly hirsute. Pedicelled spikelets \(\frac{1}{4}\) in.; gl. I with a coriaceous many-nerved centre and broad hyaline infolded wings; II lanceolate, ciliate, 5-nerved, 2 pairs submarginal. Neuter spikelets; gl. I like the pidicelled, but broader, tip 2-toothed; II lanceolate, 3-nerved, ciliate; III and IV oblong, 1-nerved, ciliate.—A curious little species, of which I have seen only indifferent specimens of Wight. In Roxburgh's Lones this and A pumilus, Roxb., are figured on the same sheet with the names transposed. Heteropogon polystachyon, Arn. (Wight Cat. 2321) under which is cited Roxburgh's A. polystachyon is A. bellariensis, Hack.

Subgen. XI. CYMBOPOGON, Hack. Spikes 2, both sessile or a sessile and shortly stipitate terminating a peduncle which is more or less sheathed by a proper spathe, often divaricate or deflexed; joints and peducels planoconvex, clavate bucciniform or linear, top concave with usually dilated toothed margins. Spikelets several pairs, lowest pair or pairs of one or both spikes homogamous, male or neuter; sessile spikelets fem. or bisexual, oblong to lanceolate, dorsally compressed; gl. I dorsally flat excavate or pitted, awnless, margins inflexed; II cymbiform, acute, keeled, awned or not; III oblong, hyaline, nerveless or 2-nerved; IV smaller, narrow, hyaline, 2-cleft, awned in the cleft, awn capillary, rarely 0; palea minute or 0. Pedicelled spikelets male or neuter, dorsally strongly compressed.

- A. Column of awn of gl. IV glabrous (rarely awn 0).
- \* Peduncle of spikes shorter than the proper spathe.
- † Joints of spikes and pedicels of upper spikelets copiously villous on the sides and back, hairs more or less concealing the sessile spikelet.
- 70. A. Iwarancusa, Jones in Asiat. Research. iv. (1795) 109; stem short or tall, leaves flat or convolute, panicle subsimple or decompound, joints of rachis and pedicels of upper spikelets subclavate tops toothed, sessile spikelets!—‡ in. linear-lanceolate acute, gl. I dorsally flat glabrous, keels scaberulous or ciliolate.

Plains of N W. India, from the Jumna westwd., and southwd. to Scind. The Western Himalaya, from Kashmir to Kumaon, and Western Tiber, ascending to 8000 tt. N. Canara and the Deccan.—Distrib. Westwd. to N. Africa.

Stems tufted, on an annulate creeping rootstock, 6 in. to 6 ft. high; whole plant usually of a pale often glaucous green. Leaves 6 in.-2 ft., narrowly linear, tips capillary, rigid or flexuous, glabrous or scaberulous, glaucous or pruinose beneath, undit bender; sheaths glabrous, lower dulated; ligule shortly oblong, membranous, ciliolate. Pancle very variable, branches distant or crowded, subsimple or much densely or loosely branched; proper spathes \(\frac{1}{3}\)-\frac{2}{3} in., longer than the peduncle of the spikes, narrowly lanceolate. Spikes \(\frac{1}{4}\)-\frac{1}{3} in., unequal; spikelets 3-4 pairs. Sessile spikelets pale, sometimes reddish; gl. I thin, keels hardly margined not winged, nerves 0 or 2-4 between the carinal; II cymbiform, acute, 3-nerved; III 2-nerved; IV narrow, lobes subulate, ciliate. Pedicelled spikelets as long as or rather longer than the sessile, purplish, narrowly lanceolate; gl. I 7-9-nerved, keels scaberulous; II margins ciliate; III broadly oblong, hyaline, fimbriate.—Roots aromatic. There are no limits between A. Iwarancusa and langer. The former is usually the larger plant, with broader leaves and often split sheaths, and is the most Eastern form. The authority for the name Iwarancusa as a specific one is not very clear. Blane describing his Nardus indica says that Sir J. Banks regarded it as a species of Andropogon. Jones incidentally gives Irawancusa as the specific name; possibly he may have taken it from Banks.

Subsp. 1. Å. IWARANOUSA proper; tall, much branched, leaves long flat, lower sheaths deciduous splitting into flat often tortuous laminæ, panicle narrow compounds. Kunth Enum. Pl. i. 493; Steud. Syn. Gram. 388. Hack. Monogr. Androp. 599; Rosb. Fl. Ind. i. 275; Aunslie Mat. Med. Ind. ii. 114; Wall. Cat. n. 8793; Trin. Sp. Gram. Ic. t. 326; Duthie Grass N.W. Ind. 19. Cymbopogon Iwarancusa, Schult. Mant. ii. 458.—Nardus indica, Blane in Phil. Trans. lxxx. (1790) 284, t. 16.—Common in N. India. I have seen no N. African specimens with the lower leaf-sheaths of this form, a character which is, however, very inconstant.—Khuskus

grass

Subsp. 2. A. LANIGER, Desf. Fl. Atlant. ii. 379; stem short subsimple, leaves junciform, lower sheaths hardened persistent, panicle narrow subsimple. Kunth Enum. Pl. i. 493; Steud. Syn Gram. 386; Hack. Monogr. Androp. 598; Astchis. Cat. Panyab. Pl. 174; Duthie Grass. N. W. Ind. 20, Fodd. Grass. N. Ind. 35, t. 23; Lisboa in Bomb. Journ. Nat. Hist. Soc. vi. (1891); Boiss. Fl. Orient. vii. 465. A. Arriani, Edgew. in Journ. Linn. Soc. vi. (1862) 208 (Ariani). A. circinnatus Hochst. & Steud. ex Steud. l. c. 387. A. criophorus, Willd. Sp. Pl. iv. 90. A. Olivieri, Boiss. Diagn. v. 76; Steud. l. c. 387. A commutatus, Aichis. in Journ. Linn. Soc. xix. (1882) 191 (non Steud). Cymbopogon arabicus, Nees ex Steud. l. c. C. circinnatus, Hochst. in Schimp. Pl. Arab. essec. Ed. 2 (1844) n. 783. C. Arriani, Astchis. l. c. C. laniger, Duthre in Atkins. Gaz. N.W. Ind. 640. Gymnanthelia lanigera, Anderss. in Schweinf. Bust. Fl. Ethiop. 300.—A. laniger is the N. African form of the species, also common in N. India. Edgeworth's A. Arriani s certainly this. The A. commutatus of Affgbanistan and Scind (Stocks) is also

this; whether the African plant of that name is the same is doubtful. I have not seen the Scind specimens of A. commutatus alluded to by Hackel (Monogr. 613); it is not probable that they differ from Stocks' plant.

†† Joints of spikes and pedicels of upper spikelets villous or ciliate on the sides, hairs not concealing the sessile spikelets, dorsally glabrous or sparsely rarely copiously hairy.

### § Leaf-sheaths terete.

71. A. Schenanthus, Linn Sp. Pl. 1046; sessile spikelets ovateor obovate-oblong dorsally flat or nearly so with a deep narrow longitudinal cleft in the centre usually below the middle and answering to a
ventral median rib, keels narrowly winged from or from above the middle,
II acute keel with a serrulate wing above the middle, Kunth Enum. Pl.
i. 493; Gruh Cat. Bomb. Pl. 238; Duthie Grass. N. W. Ind. 21, Fodd. Grass.
N. Ind. 38, t. 26.

Hotter parts of India, wild or cultivated, from the Panjab to Burma and southwd. to Travancore and Caylon.—Distrib. Westwd. to tropical Africa.

Annual? Stem 3-6 it., erect. Leaves long, broad or narrow, finely acuminate glaucous or prunose, smooth or margins scaberulous, base rounded or cordate and amplexicaul; sheath glabrous; ligule oblong, scarious. Panicle elongate, 1-2 ft. long, dense or lax, compound or decompound, rarely subsimple; proper spathes as long as the spikes, which are as long as the peduncle or shorter. Spikes unequal, one 3-4-jointed, the other 4-6-jointed; joints and pedicels narrowly clavate, half as long as the sessile spikelet, tips dilated and toothed, margins villously ciliate with long hairs. Sessile spikelets \( \frac{1}{1-\frac{1}{2}} \) im., callus obtuse shortly bearded, gl. I tip obtuse often irregularly toothed, dorsally 2-nerved or neiveless; II lanceolate, 3-nerved, ciliate, III oblong, ciliate; IV small, narrow, 2-fid, lobes subulate glabrous or ciliate; awn slender, twice as long as the gl. or longer. Pedicelled spikelets oblong-lanceolate, acute or obtuse ; gl. I glabrous or puberulous, keels hardly ciliate; II ovate, acute, 3-nerved; III oblong, ciliate, 2-nerved .- As in the case of A. Naraus, this grass has been so extensively cultivated in India that it is impossible to say where it is wild, and its synonymy is so mixed up with that of A. Nardus, and the descriptions of both are so inexact, that until the whole subject of their culture and distribution has been botanically investigated by a skilled observer in various parts of India, their history must remain obscure. Botanically, A. Schananthus is remarkable for the extraordinary difference between its broad and narrow leaved varieties. Some forms of the narrow leaved closely resemble states of A. Nardus, and can only be distinguished from it by the narrow cleft in the centre of gl. I of the sessile spikelet and its corresponding rib in the ventral face of that glume. The figure given by Ventenat (Hort Cels. t. 89) is unreliable for any grass. I give below Hackel's classification of the varieties with their synonymy, adding one which he does not appear to have seen. I am quite unable to distinguish his vars. genuinus and versicolor .- "Geranium grass, Rusa oil grass, Oil of Ginger grass." Watt.

Subsp. genumus, Hack. l.c. 609; panicle linear-oblong, secondary branches usually sumple, spikes  $\frac{1}{3} - \frac{3}{4}$  in., dorsal cleft of gl. I hardly reaching the middle of the gl., gl. IV cleft  $\frac{1}{4} - \frac{1}{4}$  way down, awn perfect, pedicelled spikelets glabrous. Wall. Cat 8794 L.

Var. Martini, leaf-base cordate and \(\frac{1}{2}\)-amplexicall, spathes and spikelets pale or spikelets reddish. A. Schonanthus, Linn. l.c.; Lisboa in Jouin. Bomb. Nat. Risk. Soc. iv. (1889) 120. A. Martini, Roxb. Fl. Ind. 1. 277; Artchis. Cat. Panjab. Pl. 175; Wight. Cat. n. 1702. A. giganteus, Hochst. in Flora (1844) 242. A. nardoides a, Nees Fl. Afr. Austr. 116. A. pachnodes, Trin. in Mem. Acad. Petersb. Ser. VI. ii. (1824) 284, Sp. Gram. Ic. t. 337. Gymnanthelia Martini, Anderss. in Schweinf. Beitr. Fl. Ethiop. 310.

Var. filiculmis, Hook. f.; stem 12-16 in., very slender, leaves  $\frac{1}{\sqrt{2}-6}$  in. broad. spikes reddish-brown.—Upper Burma, Fort Stedman, Herb. Hort. Calcutt.—

Probably only a depauperate form.

Var. versicolor, Hack. l. c. 610; leaf-base cordate semi-amplexicaul, spathes dull violet and red, spikelets more or less variegated or the pedicelled violet. A. versicolor, Nees in Wight Cat. n. 1705; Lisboa in Journ. Bomb. Nat. Hist. Soc. iv. (1889) 120, vi. (1891) 65. A. aromaticus, Sieb Fl. Maurit. (Herb. Exico) n. 38. A. connatus, Hochst. in A. Rich. Tint. Fl. Abyss. ii. 464. A. evcavatus, Hochst. in Flora (1846) 116. A. foliatus & polyneuros, Steud. Sym. Gram. 385, 389. A nardoides, \$\beta\$, Nees l. c. A. pachynodes, \$\beta\$, Nees Pl. Meyen. 190. A prunosus, Nees ex Steud. l. c. 388. A. Schoenanthus, Wall. Cat. 8794. C.N. 8795, Baker Fl. Maurit 446; Trim. Cat. Ceyl. Pl. 107; Pvent. Hort. Cels. t 89. A. versicolor, Nees ex Steud l. c; Thio. Enum. Pl. Zeyl. 367. Gymnanthelia connata, Aschers & Schweinf. in Schweinf Beitr. Fl. Æthiop. 310.

Var. cæsus, Hack. l. c.; whole plant more or less glaucous, stem slender, leaves very narrow base not dilated, pauncle subsimple, gl. I narrowly wunged. PA. bicornis, Forsk. Fl. Æg. Arab. 173. A cæsius, Nees in Hook. & Arn. Bot. Beeck. Fry 244, in Pl. Meyen. 189; Wight Cat. n. 1700, 1700a. A. Martini, Benth. Fl. Hongk. 424. A. Iwarancusa, Boiss. Fl. Orient. v. 466. Andropogon, Wall. Cat.

n. 8796.

Var gracillumus, Hook. f; glaucous, stem very slender, leaves 2-4 by  $\frac{1}{8}$  in., panicle simple, joints of rachis of spikes and pedicels nearly glabrous, gl. I of sessile spikelet truncate dorsal channel deep or shallow. Andropogon, Wall. Cat. n. 8796 (Herb Wight) Trachypogon cæsius var. a, Nees in Herb. Wight.

Subsp. clandestinus, Hack. l.c. 612, habit of var. cæsius, but gl. I and II of the pedicelled spikelet pubescent. A. clandestinus, Nees ex Steul. l.c. 388. Andropogon, Wall. Cat. n. 8794 I K.—Burma, Wallich; Upper Burma, Herb.

Hort Calcutt.

72 A. Nardus, Linn. Sp. Pl. 1046; stem tall paniculately branched leafy, leaves narrow flat, panicle subsimple to decompound, spikes in densely or loosely compacted sheathed fascicles or subsolitary, joints and pedicels rather slender tips dilated toothed, sessile spikelets  $\frac{1}{7}$  in. oblong or lanceolate, gl. I 2-toothed, dorsally flat or with shallow depressions or concave towards the base, margins winged or narrowly margined and scaberulous above the middle.

Throughout the hotter parts of India, Burma, the Malay Peninsula and

CEYLON, wild or cultivated.—DISTRIB. Trop. Asia, Africa, Australia.

In its common form it is difficult to distinguish A. Nardus from the narrow leaved form of A. Schemanthus, except by the cleft in the gl. I of the sessile spikelet of the latter; and not always very clearly by that. Both are cultivated in India and elsewhere, and A. Nardus is (except in foliage never having the broadly cordate leaf-base) quite as variable as its ally. I have been unable satisfactorily to correlate all of the Kew Indian forms with the elaborate classification of varieties established by Hackel. Both his and my conclusions must be regarded as provisional and as certain to be disturbed by a study of additional materials, or by a study of all the forms in their native localities by a specialist who has grasped the history of the species wild and cultivated, over a large area of its distribution. One of Hackel's varieties, distans, regarded as a species by Nees, should, I think, be restored to that rank (excluding a Ceylon plant included under it by Hackel); it is exclusively a Himalayan form, not found below 4000 ft., and is very constant in habit and foliage.

The var. genumus, Hack., is founded on an awnless form of the plant, which I believe (with Roxburgh) to be a cultivated state, having seen no awnless specimens in the forms known to be wild. The name is therefore inappropriate botanically, whether or no it represents the first described state of the plant, and

better suppressed.

A. NABDUS proper; rootstock stout, stem tall stout leafy, leaves long narrow, panicle large often supra-decompound oblong or subpyramidal more or less interrupted, branches loosely or closely packed erect at length often drooping, spathes laxly or closely imbricate lanceolate, proper spathes  $\frac{1}{3}$ – $\frac{3}{4}$  in., spikes with 4–5 pairs of spikelets, joints and pedicels rather slender densely or laxly cultate, sessile spikelets  $\frac{1}{6}$ – $\frac{1}{6}$  in lanceolate awned, gl. I narrowly winged, awn long or short. A. Nardus, Bentl  $\frac{5}{3}$  Trim. Medic. Pl. t. 297; Trim. Cat. Ceyl. Pl. 107. A. Nardus, var. grandis, Hack. in part). A. cæsius, Nees in Wight Cat. n. 1700c. A. Schosnanthus, Wall. Cat. n. 8794 D E. F. H.—From the Himalaya to Burma and southwd to Ceylon and Malaya. Mergui, Griff. (Kew Distrib. 6762). Bengal, Griff. (K. D. 6760, 6761).

Forma culta; gl. I of sessile spikelet, dorsally flat or deeply hollowed, awn 0 or very short included in the glumes. A Nurdus, auct. plur. A. Schomanthus, Roxb. Fl. Ind. i. 274; Wall Cat. n. 8794 E. A. Roxburghii, Nees in Wight Cat. n. 1699; Steud. l.c. 395. A. Martini, Thu. Enum. Pl. Zeyl. 367. A.

Nardus, var. genuinus, Hack. Monogr. Androp. 662 in part.

Forma abnorms, spathes empty. A. cæsius, Nees en Wight Cat. n. 1700d.

Anthistiria, Wall. l.c n. 8768.

Vur. nilagiricus, Hack. l. c. 604; tall, stem very robust sometimes as thick as the little finger, leaves 2-4 ft. by  $\frac{1}{4} - \frac{3}{4}$  in. glaucous beneath, ligule coriaceous, panicle 10-12 in. narrow, proper spathes about  $\frac{1}{2}$  in. broadly lanceolate cymbiform acuminate, sessile spikelets  $\frac{1}{2} - \frac{1}{4}$  in. dorsally flat smooth or with shallow depressions hardy winged nerves obscure, lobes of gl IV subulate, awn short or long. A. nilagiricus, Hochst. in Hohen. Pl. Ind. Or. (1851) n. 932. A. confertifious, Steud. l. c. 385. A. Nardus, var. glomeratus, Hack. l. c. A. Schemanthus, Wall Cat. 8794. B in part. Nilghiri Hills, Wight (Herb. n. 3087) &c.; Conoor, alt. 6000 ft. Gamble. Ceylon.—The spathes are normally broader than in Nardus proper.

Var. luridus, Hook. f.; stem 5-6 ft., leaves long, panicle elongate rather broad decompound branches or narrow with sparingly divided branches, spikes in large rounded crowded fascicles drying of a very dark purplish brown, spathes cymbiform, outer \(\frac{1}{2}\)-\frac{1}{6}\) in. shorter than the purplish black shortly peduncled spikes, pedicels and joints slender sparsely ciliate with long spreading hairs, sessile spikelets \(\frac{1}{2}\)-\frac{1}{2}\) in. lanceolate, gl. I dorsally flat or concave especially below, keels winged above the middle, lobes of gl. IV long chate.—Nilghiri Hills, Schmid. Ceylon,

Gardner, Maxwell.—Thwaites, A. distans may be this or A. nilagiricus.

Var. khasianus, Hack. l.c. (in part); tall, leaves 2-3 ft., panicle elongate 1-3 ft. narrow, branches short compound or decompound, spathes narrowly lanceolate outer \(\frac{2}{4}-1\) in., proper \(\frac{1}{4}-2\) in., spikes \(\frac{1}{4}-2\) in., joints and pedicels slender shortly villous, sessile spikelets \(\frac{1}{4}-2\) in. oblong-lanceolate obtuse, gl. I dorsally flat or with very shallow depressions, very rarely channelled down the centre (as in A. Schananthus) keels broadly winged above the middle, nerves 2-5 between the keels usually well marked from the middle or above it to near the top, IV rather broadly linear lobes long ciliate. A khasianus, Munro mss.—Khasia Hills, alt. 3-5000 ft., Craffith (Kew distrib. 6759, 6764, 6765); Munnepore, alt. 3500 ft., Clarke.—Wall. Cat. n. 8794 H. referred here by Hackel has no nerves or wings to gl. I of the sessile spikelets and is, I think, a form of normalis.

Var. grandis, Hack. l. c. 605 (in part); tall, stout, leaves 2-3 ft. by \(\frac{1}{2}\) in., panicle narrow loosely branched, branches distant often drooping, outer spathes \(\frac{1}{2}\) in., proper spathes \(1-\frac{1}{2}\) in., joints and pedicels shortly ciliate, sessile spikelets \(\frac{1}{2}\)-\(\frac{1}{2}\) in. oblong-lanceolate obtuse dorsally flat or slightly concave below keels margined or winged above the middle nerves obscure, keel of II sometimes shortly winged above the middle, lobes of gl. IV ciliate, awn \(\frac{1}{2}\) in. A. Schoenanthus, Wall. Pl. As. Ras. iii. t. 280, Cat. n. 8794 (in part). PA. pendulus, Nees ex Steud. l.c. 388.

—Nepal, Wallick. Sikkim, Terai and hot valleys, J. D. H., &c. Bengal, Griffith (New distrib. n. 6773). Rajmahal, Herb. Hort. Calcutt.—The very long outer spathes are seen in no other variety, but they are found shortening in some specimens to the ordinary length of khasianus and others.

Var. coloratus; stem subsimple, leaves chiefly radical 12 16 in. broad glaucous

beneath, branches of panicle few, spathes and spikes densely fuscicled red-brown when dry, proper spathes about \( \frac{1}{2} \) in. very narrow, sessile spikelets as in \( A. Nardus \) proper, of which this is a small state with highly coloured spathes. \( A. \) coloratus, \( Nees ex Wight Cat. n. 1703. \( Wall. Cat. n. 8794 \) B (in part). \( -S. \) India, \( Heyne, \)

Wight.

Var. flexuosus, Hack. l. c. 603; stem slender, panicle decompound, branches very slender flexuous almost zigzag, proper spathes about ½ in. narrow divergent, spikes very short with 2-4 pairs of spikelets, joints and peduncles slender laxly ciliate with spreading hairs, sessile spikelets ½-½ in. lanceolate, gl. I acuminate 2-cuspidate dorsally flat nerveless keels margined scabrid, gl. IV ciliate, awn short. A. flexuosus, Nees ex Wight Cat. n. 1704; Steud. l. c. 388.—Southern India, Heyne, Wight.

Var. microstackys, Hook. f.; tall, very slender, leaves narrow, paniele very long slender erect bearing few distant solitary or subsolitary erect filiform branches with one or few very small deflexed spikes, sheaths very narrow tubular erect \(\frac{1}{2}-\frac{3}{4}\) in., spikes \(\frac{1}{3}-\frac{1}{4}\) in., joints 2-3, pedicels rather stout shortly ciliate, spikelets \(\frac{1}{3}-\frac{1}{4}\) in. ovate-oblong or -lauceolate, gi. I dorsally flat or concave below the middle, keels margined or winged nerves obscure or 0, IV very narrow lobes ciliate.—Forests of Oudh, Thompson. Garo Hills, Mann.—A very distinct-looking plant, from the long erect lower branches and narrow sheaths of the very long slender paniele, short spikes and small spikelets. In the Oudh specimen gl. I is rather broadly winged, and awn short; in the Garo one gl. I is scarcely margined and the awn \(\frac{1}{3}\) in. long. In some respects it approaches 74, A. microtheca.

Var. exsertus, Hack. l. c. 608; stem not tall slender, leaves very long and narrow, panicle elongate very narrow, branches short distant, spikes few subsolitary long-peduncled, proper spathes about 1 in., spikes  $\frac{1}{2}$ -1 in., joints 5-6 and pedicels rather slender shortly villous, sessile spikelets  $\frac{1}{5}$  in. ovate or oblong 2-toothed dorsally flat or slightly concave 1-2-nerved keels margined or shortly winged, IV eciliate awned. A. Schenanthus, Wall. Cat. n. 8794 M.—Hort. Bot. Calc., Wallich. Bengal, Griffith (Kew distrib. n. 6763, probably Hort. Calc.).—Probably a form of

A Nardus altered by culture.

Var. Strachey, Hook. f.; tall, slender, leaves long narrow, panicle strict erect very narrow lax-fld., branches short with few spikes, proper spathes about \(\frac{1}{2}\) in. cymbiform, spikes \(\frac{1}{2}\)—1 in. brown, joints 6-8 and pedicels subclavate shortly ciliate, spikelets \(\frac{1}{6}\)—\(\frac{1}{4}\) in. lanceolate or linear-lanceolate, gl. I bicuspidate, dorsally flat or more or less hollowed nerveless keels hardly margined, IV broad lobes elongate strongly ciliate, awn \(\frac{1}{2}\) in. A. Martini, Herb. Strach. \(\frac{1}{2}\) Winterb. n. 2.—Kumaon, at Kalenath, alt. 6000 ft., Str. \(\frac{1}{2}\) W. Kunawur, Pangi, Stolizka.

73. A. distans, Nees ex Steud. Syn. Gram. 387; rootstock 0, roots fibrous, stem 1-2 ft., leaves almost filiform flexuous, proper spathes  $\frac{2}{3}$ -1 in, spikes 1-1 $\frac{1}{3}$  in. solitary or few together scattered forming a subsimple panicle, joints and pedicels narrowly clavate silkily ciliate, sessile spikelets  $\frac{1}{3}$ - $\frac{1}{3}$  in. narrowly lanceolate dorsally flat 5-7-nerved between the narrowly winged keels, keels of II winged above the middle, lobes of IV ciliate. Duthie Grass. N.W. Ind. 19. A. Nardus var. distans, Hack. Monogr. Androp. 608.

TEMPERATE HIMALAYA, alt. 4-7000 ft. (to 9000 ft. in Garwhal, Duthie), from

Kashmir to Kumaon, Royle, &c.

A very distinct odoriferous form or species, confined to elevations above 4000 ft. on the Himalaya, conspicuous for its almost simple (not paniculately branched) stems, leaves very narrow and tufted at their bases, distant large pale or reddish long deflexed spikes and very narrow long spikelets with strong nerves on gl. I of the sessile, tips of gl. I of the sessile spikelets more or less, sometimes deeply 2-cuspidate, margins of gl. II pubescent, IV broader than in A. Nardus pro-

per with long subulate-lanceolate ciliate lobes—Specimens collected by Falconer and by Duthie, at 8900 ft. in Garwhal, have filiform flexuous or tortuous leaves. The Ceylon A. distans, Thwaites, from Newera Elia, is a much longer leaved plant, has very dark spikes and is a dwarf starved state of A. nilagrica, I suspect. Lisboa (Journ. Bomb. Nat. Hist. Soc. vi. (1891) cites A. distans as a native of N. Canara, but I have no means of confirming the identification.

74. **A. microtheca,** Hook f: tall, panicle elongate narrow decompound, branches very slender erect elongate, spikes  $\frac{1}{8}-\frac{1}{4}$  in. solitary rarely fascicled shortly peduncled deflexed, proper spathes  $\frac{1}{2}$  in. narrowly lanceolate divaricate, spikes very short, joints few and pedicels clavate or bucciniform mouth toothed margins very shortly ciliate, sessile spikelets  $\frac{1}{10}-\frac{1}{8}$  in., gl. I ovate-lanceolate or lanceolate dorsally deeply concave with thickened margins, pubescent in the hollow.

EAST NEPAL; hot valleys, alt. 3-4000 ft., J. D. H.

Stem 3-4 ft, slender. Leares long, narrow. Panicle leafy below; leaves on the flowering branches short, erect, strict, appressed to the branches, bearing in their axils the very small peduncled proper spathes which project horizontally; peduncle of spikes about half the length of the proper spathe and wholly concealed in it, the very small few-fid spikes alone being exserted; proper spathes \frac{1}{3} \frac{2}{3} in., narrowly lanceolate, acuminate, strict, glabrous. Gl. I of sessile spikelets variable in breadth. rarely flat dorsally, keels scaberulous above the middle, tip minutely 2-cuspidate; II acute, keel scaberulous below the tip; III ovate-oblong, acute, 2-nerved, ciliate; IV narrow, 2 fid, lobes subulate eculiate, awn 1 in.; palea minute, oblong or orbicular. Pedicelled spikelets (sometimes fem.), ovate-oblong, subacute, gl I 7-nerved, keels scaberulous; II acuminate, 3-nerved; III oblong, obtuse; IV linear, tip 2-fid, 1-nerved nerve excurrent; palea minute, ovate -The long slender branches of the panicle, with rather distinct spikes, and divergent proper spathes, short stout pedicels and joints, and minute spikelets (the smallest of the Indian Cymbopogons) characterize this species. Its nearest ally is N. Nardus var. microstachys. Munro had given the mss. name of Hookers to it; but it is not his A. Hookers of Bhotan, nor that described by Hackel. The pedicelled spikelets described above are abnormal in being female.

75. A. Gidarba, Ham. ex Wall. Cat. n. 8797; stem slender subsimple, leaves narrow, panicle narrow elongate, branches rather distant short, joints and pedicels clavate, sessile spikelets  $\frac{1}{8}-\frac{1}{5}$  in., gl. I linear-lanceolate 2-toothed dorsally deeply concave below the middle with a boss at the base of the cavity, keels scaberulous neither winged nor margined. Steud. Syn. Gram. 387; Hack Monogr. Androp 613; Duthie Grass. N.W. Ind. 20.—Andropogon, Wall. Cat. n. 8797, 8798 D.

WESTERN HIMALAYA, Falconer, &c.; Simla, alt. 7-8000 ft., Duthie. Behar, at Monghir, Hamilton; Gya, Herb. Calcutt.

Stem 4-6 tt, erect. Leaves 1-2 ft., finely acuminate, glabrous on both surfaces or puberulous above, midrib slender, margins smooth ciliate towards the base; sheath terete, glabrous; ligule short, truncate. Pancle very slender, branches simple or the lower divided; proper spathes \(\frac{2}{3}\)-1 in., narrowly lanceolate, about twice as long as the peduncle. Spikes \(\frac{1}{3}\)-1 in., strict, at length deflexed; joints and pedicels shortly villous Sessile spikelets pale or dark green, with sometimes a dorsal circular pit above the middle, margins raised; II cymbiform, acute, 1-nerved; III lanceolate, 2-nerved; IV narrow, 2-cleft, lobes subulate ciliate; awn \(\frac{1}{2}\)-1 in., espillary. Pedicelled spikelets rather longer than the sessile, lanceolate, acute, glabrous.—Odour described as terebinthine.

- §§ Leaf-sheaths compressed, keeled.
- 76. A. Hookeri, Munro ex Hack. Monogr. Androp. 614; tall, slender, leaves long linear, panicle linear interrupted, branches suberect nearly simple, proper spathes  $\frac{2}{3}-1\frac{1}{4}$  in., joints and pedicels of spikes stout clavate, sessile spikelets  $\frac{1}{4}$  in. dull violet dorsally deeply concave puberulous keels scabrid.

BHOTAN? Griffith (Kew Distrib. n. 6767 ex Hack.).

Leaves 12-16 by \(\frac{1}{10}\)-\frac{1}{5}\) in., rather rigid, smooth, margin scabrid, midrib broad keeled below; ligule obtuse, membranous, glabrous. Panucle 12-16 in.; primary branches of 1-2 nodes giving off solitary secondary. Spikes subequal, joints and pedicels dorsally glabrous, margins sparsely villous, tips 2-3-lobed. Essstle spikelets, gl. I coriaceo-chartaceous, acute, minutely 2-toothed, keels not margined or winged obscurely 2-nerved; II lance-late, acute, keel scabrid, margin eciliate; IV 2-cleft, lobes slender eciliate; awn about \(\frac{3}{4}\) in. Pedicelled spikelets equalling the sessile, linear-lance-late, glabrous.—I have not recognized the above amongst Griffith's plants in the Kew Herbarium. The Bhotan plant bearing the number 6767 in that Herbarium and named by Munro A. Hookeri, is not a Cymbopogon, but probably a Schizachyrum, in too imperfect a state for determination. Munro has also attached the name A. Hookeri to my A. microtheca, which was appropriate for a plant first found by myself.

- \*\* Peduncle of spikes longer than the proper spathe.
- 77. A. lividus, Thwaites Enum. Pl. Zeyl. 367; erect, leaves narrow rigid, spikes long-peduncled, pedicels and joints clavate, sessile spikelets in, gl. I lanceolate obscurely 2-toothed keels with narrow scaberulous wings, II shortly awned with a dorsal serrulate wing above the middle, IV deeply 2-fid segments villously ciliate. Hack. Monogr. Androp. 615, Trim. Cat. Ceyl. Pl. 107.

NILGHIBI HILLS, Schmid. CEYLON; Mountains, alt. 7000 ft., Thwaites, (C.P. 953).

Stems 1-2 ft., tufted, strict, smooth, rigid. Leaves 4-6 in., strict, erect, acuminate, strongly nerved, nearly smooth; lower sheaths short; ligule oblong. Peduncles 1-4, terminal and axillary; spikes 1-2 in., erect, dull reddish-brown; joints and pedicels about half as long as the sessile spikelet, margins ciliate with silky hairs, tips cupped and toothed. Sessile spikelet, callus very short; gl. I flat, glabrous, margins broadly incurved below, nerves obscure; II narrow, ciliate, dorsally rounded; III oblong, ciliate, 2-nerved; IV as long as III; awn very slender, about twice as long as the spikelet; palea 0. Pedicelled spikelets as long as the sessile, linear-oblong, subacute, dorsally convex, glabrous, many-nerved, keels scaberulous, margins broadly incurved; II ovate-oblong, acuminate, sub 3-nerved, ciliate; III as in the sessile; IV as long, hyaline.—Schmid's Nilghiri specimen was distributed by Dr. Stahl mixed with A. pertusus, which it strongly resembles.

- B. Column of awn hirsute.
- 78. A. filipendulus, Hochst. in Flora, xxix. (1846) 115; Steud. Syn. Gram. 389 (filipendulnus). Hack. Monogr. Androp. 634; Trim. Cat. Pl. Ceylon, 107. A. finitimus, Hochst. ex A. Rich. Tent. Fl. Abyss. ii. 465; Steud. l. c.; Hack. l. c. 637; Baker Fl. Maurit. 446. A. Griffithii, Munro in Cat. Pl. Griffith, Falconer, &c. 58 (ined.). A. lachnatherus, Benth. Fl. Austral. vii. 434. A. procerus, F. Muell. Fragm. viii. 124 (non Br.). Hyparrhenia finitima, Anderss. in Schweinf. Beitr. Fl. Æthiop. 310. Anthistiria fasciculata, Thw. Enum. Pl Zeyl. 366.

KHASIA HILLS, Griffith, Clarke. CEYLON; Badulla district, alt. 3000 ft..

Thwaites .- DISTRIB. Trop. Asia, Afr., and Austral.

Stems 3-4 ft., erect, leafy, subsimple or branching from the base, nodes glabrous. Leaves 2-3 ft. by 10 k in., linear, setaceously acuminate, scaberulous or smooth, margins scabrid; sheath terete, smooth, glabrous or mouth hairy; ligule short, membranons. Panicle 1-2 ft., narrow, compound, branches slender, nodes glabrous or pubescent. Spathes 1-3 in., linear-lanceolate, acuminate, or tips setaceous, glabrous ciliate or bairy. Peduncle much shorter than the spathe, bearded above with white hairs. Spiles 1-3 in., one subsessile with one pair of homogamous spikelets, the other 10-1 in. long with two (rarely 0) homogamous pairs; heterogamous spikelets 1-3 pairs; joints and pedicels very short, linear, ciliate or villous, tips very oblique. Gl. I of sessile spikelets \(\frac{1}{4}-\frac{1}{3}\) in.; callus acute, bearded; gl. I membranous, truncate, 5-7-nerved, glabrous or villous, dorsally slightly channelled or not; II oblong. obtuse, keel glabrous or ciliate, 3-nerved; III hnear-oblong, obtuse, hyalme, ciliate; IV shorter, 2-toothed, glabrous; awn 2-2½ in., column hispid with rufous hairs. Pedicelled spikelets linear-lanceolate, gl. I acute, 7-9-nerved, keels setulose; II oblong, keeled; III and IV hyaline or 0 .- Homogamous spikelets not awned .-Hackel has 4 varieties under A. filipendulus, depending chiefly on the relative length of the spathe and peduncle, and the number 1 or 2 of the heterogamous spikelets. Of these v. Thwaitesu is the Ceylon plant, with one pair of heterogamous and two of homogamous on the stipitate spike. A. finitimus has normally 2-3 pairs of heterogamous spikelets on each spike -These and two other African species, A. Barteri, Hack, and A. familiaris, Steud., are very closely allied, and regarded by Hackel as probably subspecies of filipendulus.

#### DOUBTFUL AND EXCLUDED SPECIES OF Andropogon.

A. CITRATUS, DC. Cat. Hort. Monsp. 78, name only.—May be either A. Nardus

or A. Schænanthus, ex Hack. Monogr. Androp 608.

A. CYMBACHNE, Hack. Monogr Androp. 450. Cymbachne ciliaris, Retz. Obs. vi. 36. Rottboellia Cymbachne, Willd. Sp. Pl. 1. 465. ? Arthrostachys gracilis, Desv. Opusc 74, t. 6, f. 2.—Bengal, Kanig.—An obscure plant, described by Hackel from an incomplete specimen in the Copenhagen Herbarum, and referred to the section Arthrolepis.

A. CYMBARIUS, Linn. Mant. ii. 303; Hack. l. c. 629. An African plant, stated

by Linnæus to have been found in India by Konig.

A. DACTYLOIDES, Steud. ex Duthre Grass. N. W. Ind. 19. ? Lepeocercis digitata. Nees .- Doab, and banks of the Jumna, Royle .- A. dactyloides, Steud., is Trackypogon polymorphus, Hack., not an Indian plant, and Lepeocercis digitata. Nees ex Royle, is a name only, not taken up by Hackel.

A. DEPAUPERATUS, Kunth Revis. Gram. i. 166, Enum. Pl. i. 509 : Hack. I. c. 565. Pollinia depauperata, Spreng. Pugill. ii. 11, Syst. Veg. i. 289.—Bengal.—An

indeterminable species of subgen. Chrysopogon.

A. DIVERSIFLORUS, Steud. in Zoll. Syst. Verz. 58, is Polytrias præmorsa, Hack. (Androp. 189), a Javanese plant not hitherto found in British India.

A. Flabelliformis, Rosb. ex Spreng. Pugill. ii. 9, Syst. Veg. i. 283; Kunth l. c. 509; Hack. l. c. 651.—Bengal.—Is indeterminable.

A. FULVUS, Spreng. Pugill. ii. 8, Syst. l. c. 287; Kunth l. c. 503; Hack. l. c. 565. -Bengal.-Is undeterminable.

## 54. ANTHISTIRIA, Linn.

### THEMEDA, Forsk.

Tall, annual or perennial grasses. Leaves long, narrow. Spikes many, short, crowded in spathaceous panicled fascicles, each in a proper spathe. very shortly peduncled, inarticulate at the base. Spikelets 6-11; 4 lowest male or neuter, involucriform, awnless, in superposed pairs or whorled round a jointed rachis which bears one or more sessile bisexual or fem. usually awned spikelets, each with one or if more than one then the uppermost with pedicelled male or neuter awnless spikelets inserted on its callus. Bisexual (or fem.) spikelets linear-oblong; callus long or short; gl. I terete, or dorsally compressed or channelled, coriaceous, at length hardened, margins incurved not keeled; II as long, coriaceous, 3-nerved, keeled, keel broad, margins thin incurved; III oblong, hyaline, 1-nerved; IV the very slender sometimes narrowly hyaline base of an awn, rarely awnless; palea 0. Lodicules cuneate Stamens 3. Styles free, and stigmas long. Grain oblong. Pedicelled spikelets lanceolate, dorsally compressed; pedicals slender, compressed; gls. 1-3, I many-nerved, margins inflexed, keels often winged; II as long as I, 1-3-nerved, hyaline, or 0; III smaller or 0.—Species about 10; warm regions of the Old World.

The species of this genus are most difficult of discrimination, of which the best proof is the irreconcilable conclusions of two excellent botanists, both experts in the Order of Gramineæ, Andersson (in Nov. Act. Upsal. III. ii. (1856), and Hackel

(Monogr. Androp.).

Hackel has restored Forskahl's name of Themeda because of its having four years of priority, and of Linnæus' description of Anthistiria being very inaccurate. The claim of priority is obvious, but if that of inaccurate description is admitted, it should invalidate the recognition of a host of the genera of old authors. Against both claims stands the fact, that Anthistiria had for upwards of a century been adopted by all botanical writers.

- \* Involucrant spikelets inserted on a level, all sessile; glumes 3, solitary in A. arguens.
- 1. A. arguens, Willd. Sp. Pl. iv. 901; annual, spikes in lax nodding heads, outer spathes 3-5 in. very narrow base hirsute, proper spathes  $\frac{1}{2}$ -1 in., involucr. spikelets 2-4  $\frac{1}{2}$  in. unequal, glume solitary. Kunth Enum. Pl. i. 482; Steud. Syn. Gram. 401. A. frondosa, Br. Prodr. 200; Benth. Fl. Austral vii. 542. A. arundinacea, Hassk. in Tijdsschr. Nat. Gesch. x. 115 (non Roxb.). A. ciliata var. Junghuniana, Buse ex Mig. Fl. Ind. Bat. iii. 504. A. pilifera, Steud in Zoll. Syst. Verz. 58, Syn. Pl. Gram 400. A. Junghuniana, Nees in Jung Jav. ex Anderss. in Nov. Act. Upsal. Ser. III. ii. 233. Aristaria barbata, Jungh. in Tijdschr. Nat. Gesch. vii. 296. Themeda arguens, Hack. Monogr. Androp. 657. Stipa arguens, Linn. Sp. Pl. Ed. II. 117.

Malacca, Griffith. Andaman Islds., Prain.—Distrib. Malaya, Australia. Stems tall or short, sometimes 10 ft. high, stout or slender. Leaves 10-16 by \(\frac{1}{2}\) in. or narrower, and sheaths glabrous or sparsely hairy; ligule rounded. Heads of spikes flabelliform, long-peduncled; spikes with often imperfect scattered linear hyaline spikelets on the peduncle. Invol. spikelets very irregular, often only 2, linear-lanceolate, hyaline, 5-6-nerved. Bisexual spikelets \(\frac{1}{4}\)-\frac{1}{2}\) in, solitary, cylindric, with a long pungent dorsally brown-bearded callus, brown when ripe, obscurely nerved, smooth and dotted below, scabrid and hispid towards the tip. Ann very stout, often 3 in. long, dark brown.—The Malaccau specimens are small (1-2 ft.), and weaker than the insular.

2. A. imberbis, Retz. Obs. iii. 11; perennial, spikes in globose or fan-shaped fascicles, spathes glabrous or sparsely hairy, outer 1-2 in., proper about  $\frac{1}{2}$  in., invol. spikelets  $\frac{1}{3}-\frac{1}{2}$  in. glabrous or ciliate with tuberclebased hairs gls. 3, bisexual spikelets solitary  $\frac{1}{4}-\frac{1}{3}$  in. with 2 pedicelled

scabrid towards the tip only, callus long pungent. Kunth. Enum. Pl. i. 481; Steud. Syn. Gram. 401. A. Forskahlii, Kunth Revis. Gram. i. 162, Enum l.c. 483; Steud. l.c. 402. A. vulgaris, Hack. in Engl. & Prantl. Natürl. Planzenf. ii. II. 29. Themeda triandra, Forsk. Fl. Ægypt. Arab. 178. T. polygama, Gmel. Syst. 149. T. Forskahlii, Hack Monogr. Androp. 659; Dulhae Fodd. Grass. N. Ind. 43.—Anthistiria, Wall. Cat. n. 8764, A. C. E. F.

Hotter drier parts of India, from Upper Bengal to Travancore, ascending the Himalaya to 3-4000 ft (Var. Roylei to 10,000 ft.). Burma. Ceylon, ascending to

4000 ft .- DISTRIB. Warm regions of the Old World.

Stem 1-6 ft., stout or slender, subsimple or branched. Leares 3-10 in., linear, rather rigid, glabrous or sparsely hairy, green or subglaucous beneath; ligule short, ciliolate. Head of fascicles of spikes few or many, long- or short-peduncled; spathes glabrous or ciliate with usually very small tubercle-based hairs; proper spathes longer than the spikes, cymbiform, tips acute or subacute. Involucr. spikelets & in., oblong-lanceolate, acute or acuminate, red brown, dorsally hispidly ciliate or glabrous, glumes 3. Bise rual spikelets cylindric, obtuse, with long brown hairs; gl. I terete, dorsally rounded, ripe polished dark brown, hispidulous towards the tip only; awn \(\frac{1}{2}-2\) in. long, base capillary. Pedicelled spikelets very narrow, glabrous or cultate with a few tubercled-based hairs, keels culiolate.—A very variable grass, some states of which are with difficulty distinguishable from A. ciliata. The earliest names of this plant are Themeda triandra, For k., and Anthistiria imberbis, Retz. Hackel has abandoned both, substituting first Anthistima vulgaris, and then Themeda Forskahlii, on the ground that A. imberbis was perhaps not Forskahl's T. triandra (why then call it Forskahlei?) of which no type specimen exists, and because triandra indicates a character of no individual value in grasses. In so doing he overlooked Gmelin's \* name of T. polygama (Syst. 149). Having regard to the wide range of A. umberbis, from Australia to Africa, its presence in Arabia might well be anticipated; and that it is a native of that country is now proved by Schweinfurth's finding Hackel's var. glauca in that country. This makes the var. (which is local, and not Indian) the type of the species, and, if Forskahl's name of Themeda is to be retained, necessitates a rearrangement of the varieties. To me it appears most expedient to retain Retz's name which applies to the prevalent form over the area of distribution as the specific one.

The following is Hackel's arrangement of the Indian forms which may be variously reduced or added to. It has the great merit of systematizing the authorities fairly well. Of these I have kept up var. laxa as a species, following Audersson, though not without doubts. Of others, as A. polystachya, I am doubtful, judging from Roxburgh's description and its being an annual, I suspect it may be a state of ciliata. Andersson included it under A. arguens, which it certainly

1s not.

\* Stem 1-3 ft. Leaves 2-8 by \(\frac{1}{10}\)-\frac{1}{5} in. Panicle 6-12 in., nodes 2-3, lower branches simple below. Gl. I of invol. spikelets not winged or narrowly on one

side only

Var. vulgaris, Hack. l. c. 660; spikelets with many tubercle-based hairs. A. ciliata, Retz. l. c. (non Linn. f.); Lamk. Ill. t. 841, f. 2; Cav. Ic. t. 459; Roxb. Fl. Ind i. 247; Wight. Cat. n. 1708, Anderss. in Nov. Act. Sc. Upsal. ii. (1856), in Walp. Ann. vi. 1057; Grah. Cat. Bomb. Pl. 239; Dalz. & Gibs. Bomb. Fl. 304; Thw. Enum. Pl. Zeyl. 366 (excl. var. major); Trim. Cat. Ceyl. Pl. 108; Benth. Fl. Austral. vii. 542. ? A. polystachya, Roxb. l. c. 248; Kunth Enum. Pl. i. 481; Steud. l. c.

Var. imberbis, Hack. I. c. 661; invol. spikelets glabrous or very sparingly hairy. A. ciliata var. imberbis, Nees in Linnaa vii. (1832) 284. A. ciliata var.

<sup>\*</sup> Gmelin has, by oversight probably, assumed the first word of Forskahl's brief diagnosis to be his specific name.

major, Thw. l. c. 366. A. ciliata? Munro in Herb. Gruff. (Kew distrib. n. 6808). A. australis, Br. Prodr. 200; Kunth l. c., Stewd. l. c.; Anderss. t. c. 13; Walp. l. c. 1058. A. arguens, Wuyht Cat. n. 1709. A. imberbis, Retz. Obs. iii. 11; Kunth l. c. 481 (excl. Syn.).—Anthistiria, Wall. Cat 8764, A. E. F.

\*\* Stems 3-5 ft. Leaves 8-16 by  $\frac{1}{5}-\frac{1}{2}$  in. Panicle 16-24 in.; nodes 5-6; lower branches usually compound. Gl. I of invol. spikelets with often broad

scarious margins.

Var. major, Hack. l. c. 662; proper spathes and invol. spikelets hirsute with green or white tubercle-based hairs. A. ciliata, Thunb. Fl. Jap. 40; Wight Cat. n. 1708. PA. puberula, Anderss. l. c. 12; Walp. l. c. 1038 (see Var. Roylei).

\*\*\* Annual? Stem very slender, unbranched; leaves very narrow.

Var. Roylei, Hook. f.; spikes few in peduncled axillary fascicles, spathes glabrous outermost 2-3 in. proper rather longer than the spikes, invol. spikelets \(\frac{1}{2}\) in. naked or with a few cilia, bisexual \(\frac{1}{2}\)-\(\frac{1}{3}\) in. hispid towards the tip, pedicelled longer glabrous, keels not ciliate. \(\frac{2}{1}\)A. puberula, Anderss. l. c. 12; \(Walp. l. c. 1058\). A. ciliata, \(\beta\), Nees in Herb. Royle.—N. W. Himalaya, Royle; Simla Hills, Thomson. Kumaon, alt. 7500 ft., Strach. & Winterb. (A. ciliata).—A very distinct form, and the only temperate one of \(A.\) imberbis. It closely resembles \(A.\) Hookeri, the only other temp. Himalayan species, which has superposed pairs of much larger invol. spikelets, solitary spikes and short spathes. The glabrous spikelets and larger sessile spikelets hispid at the top distinguish it from ciliata.

3. A. laxa, Anderss. in Nov. Act Sc. Upsal. Ser. III. ii. (1856) 243; perennial, stem tall stout leafy proliferously branched, panicles of spikes small of few spikelets in a long lax subsimple leafy panicle shortly peduncled, outer spathes  $\frac{1}{2}-1$  in., proper spathes nearly glabrous hardly longer than the spikes, involuc. spikelets  $\frac{1}{7-6}$  in nearly glabrous gls. 3, bisexual spikelets  $\frac{1}{8}$  in solitary with 2 pedicelled, callus short, pedicelled spikelets glabrous or nearly so, awn  $1-1\frac{1}{2}$  in. Walp. Ann. vi. 1059. Themeda Forskahlii, var. ? laxa, Hack. Monogr. Androp. 663.—Anthistiria, Wall. Cat. n. 8775.

NEPAL, Wallich. BHOTAN, Griffith. CENTRAL PROVINCES; Khandwa, Duthie. Intermediate between A. imberbis and ciliata, with very stout erect polished stems 2-3 ft. high, as thick as a goose-quill, and very small nearly glabrous heads of spikes. The panicle is leafy and all the leaves are very narrow. There is a specimen in the Kew Herbarium from Roxburgh, but without habitat. It may prove to be a form of A. imberbis, with small spikelets, or of strigosa, with unarmed spathes and spikelets.

- 4. A. ciliata, Linn. f Nov. Gram. Gen. 35; annual, spikes in globose or fan-shaped fascicles, outer spathes 1-3 in. glabrous or sparingly ciliate, proper spathes and spikelets usually copiously clothed with tubercle-based bristles, invol. spikelets \(\frac{1}{2}-\frac{1}{2}\) in. gls. 3, bisexual spikelets \(\frac{1}{2}-\frac{1}{2}\) insually solitary with 1 or 2 pedicelled spikelets scabrid, callus short obtuse, awn 1-1\(\frac{1}{2}\) in. Gwrin. Carp. ii. 465, t. 175; Lamk. Illustr. t. 841, f. 1; Beauv. Agrost. t. 23, f. 7; Steud. Syn. Gram. 401; Duthie Grass. N.W. Ind. 42; Baker Fl. Mawrit. 448. A. barbata, Desf. in Journ. Phys. xl. 294, t. 2. A. scandens, Roxb. Fl. Ind. i. 248. A. semiberbis, Nees Fl. Afr. Austr. 125. Themeda ciliata, Hack. Monogr. Androp. 664. Andropogon untans, Linn. Mant. ii. 303. A. quadrivalva (err. typog.) Linn. Syst. Veg. Ed. xiii. 758.—Anthistiria, Wall. Cat. n. 8764 B. D.
- N. W. India, Royle, Kumaon, ascending to 7500 ft., Nepal, Wallich. Bengal, Rowburgh. Behar, J. D. H. The Concan, Central Provinces, Malabar and Tenasserim.—Distrib. Mascarene Islds.

In habit and size A. cihata often resembles the ordinary states of A imberbis and it

varies quite as much as that species does. The diagnoses given above serve to distinguish them, especially the small size of the spikelets of A. ciliata, its annual habit and the large size of the tubercles on which the far more copious rigid bristles are inserted. Roxburgh describes it as perennial and scandent, with stems many feet long, rooting at the nodes, but Hackel has pointed out that Roxburgh's description is that of an annual; and as I have seen it growing in Bengal, it is lather a scrambler amongst bushes than scandent in a strict sense. The stems are also often erect with a geniculate base.

Var. Helferi; dwarf, spikes in more compact globose heads. A. Helferi, Munro mss. Themeda Helfer, Hack l. c. 665.—Tenasserim, Helfer -I think this is oulv a dwarf variety of A. ciliata, specimens of which accompany it in Helfer's

herbarium.

5. A. strigosa, Ham. mss; perennial, stem tall rather stout, spikes in small dense shortly peduncled heads arranged in a long very nairow panicle with filiform leaves, spathes very short glabrous, invol spikelets 1-1 in. gls. 3 dorsally clothed with very rigid tubercle-based bristles, bisexual spikelets 1-2 1-1 in. hispidulous towards the tip, callus short obtuse, awn very short capillary.—Anthistiria, Wall. Cat. n. 8766.

Lower Assam, Hamilton. Behar, Monghyr, Herb Calcuit.

Stem 3-4 ft, erect, as thick as a small goose-quill, polished. Leaves 1 ft. by 1-1 in., smooth, tips filiferous; sheaths polished, terete, keeled; ligule a narrow ciholate membrane Panicle 1-2 ft., with one or two lower long avillary branches; leaves of panicle 6-10 in., flexuous; fascicles of spikes triangular, about & in broad, outer spathes hardly longer than the fascicles cymbiform with very slender tips, glabrous. Invol. spikelets gl. I maigins narrowly winged, II as long, acuminate, 3-nerved; III lanceolate, hyaline, 1-nerved. Bisexual spikelets terete; callus bearded with white hairs; gl. II coriaceous, notched, awned; III shorter, hyaline, 1-nerved, IV the very narrow bifid hyaline margin of an excessively slender awn i in long; palea minute. Gl. I of pedicelled spikelets lanceolate, keels with long stiff tubercle-based hairs.—The long panicle and very small heads with short spathes, and the strongly armed gls of the invol. and pedicelled spikelets distinguish this from A. interbis, and ally it to ciliaris with which it agrees in the size and armature of the spikelets.

- \*\* Involucrant spikelets in superposed pairs, glumes 3 or 4.
- + Callus of bisexual spikelets short, obtuse.
- 6. A. tremula, Nees ex Steud. Syn. Gram. 401; tall, slender, panicle sparingly branched, spikes in subflabelliform fascicles  $\frac{1}{2}$ -1 in. broad, outer spathes  $\frac{1}{2}$ -1 in., invol spikelets softly hairy, bisexual spikelets 1 or 2 hispidulous deeply dorsally channelled, awn 1-2 in. Thw. Enum. Pl. Zeyl 366; Trim. Cat. Ceyl. Pl. 108. A. arguens, Heyne ex Wall. Cat. n. 8765. Androscepia tremula, Anderss. in Nov Act. Upsal. Ser. III. ii. (1856) 247. Themeda tremula, Hack. Monogr. Androp. 667.—Anthistiria. Wall. Cat. l. c

The DECCAN PENINSULA; from the Concan and Central Provinces southwd.

CEYLON, Walker, Thwaites (C P. 961 in part).

Perennial? Stem tuited, 1-3 tt., rarely thicker than a crow-quill. Leaves 6-12 in , finely acuminate, nearly smooth, margins scaberulous, upper often exceeding the panicle; ligule a narrow membrane. Panicle 1-2 ft., subsimple, of many usually distant compound fascicles of spathes and spikes on flexuous capillary peduncles 1-1 in. long; lower branches sometimes elongate and again panicled; fascicles red brown when dry, the larger sometimes semiglobose; outer spathes usually hardly longer than the fascicles, proper spathes not twice as long as the spikes, sides and keel ciliate.

Invol. spikelets 1 in.; gls. 3, ovate-lanceolate, acuminate, margins with narrow scarrous wings, doisally coprously ciliate with tubercle-based hairs; II as long, lanceolate, acuminate, membranous, 3-nerved; III as long, hyaline, lanceolate, acuminate, 2-nerved. Bisexual spikelets in., usually 2, lower with one pedicelled spikelet, upper with two; callus hairs rusty. Pedicelled spikelets lanceolate, gls. 3; I lanceolate, dorsally cluate with long hairs and one margin winged; II and III as in the involucrant spikelets.

7. A. Thwaitesii, Hook. f.; tall, very stout, nodes glaucous, panicle leafy, spikes in dense subflabelliform fascicles 1-11 in. broad, outer spathes  $1-2\frac{1}{2}$  in., bisexual spikelets 2 hispidulous dorsally channelled, awn l'ın.

CEYLON, Thwaites (C.P. 961 in part).

Perennial? Stem probably 5-6 ft., thicker than a goose-quill, polished. Leaves 1-2 ft. by  $\frac{1}{2}$  in., finely acuminate, tips setaceous, ligule a ciliolate narrow membrane. Panicle 12 in. or more; rachis stout, leafy; leaves 6-10 in. long. Fascicles of spikes as in A. tremula, but larger and less hairy.

8. A. Cymbaria, Roxb. Fl. Ind. i. 251 (excl. Syn.); tall, stout, panicle supradecompound thyrsiform, spikes innumerable glabrous densely crowded in small long peduncled narrow fascicles  $\frac{1}{4}$  in long, proper spathes  $\frac{1}{3}$ - $\frac{3}{3}$  in. linear-lanceolate, invol. spikelets  $\frac{1}{3}$ - $\frac{1}{3}$  in. acuminate glabrous gls. 4, bisexual spikelets solitary (rarely 2) awned, callus hairs white soft = \frac{1}{2} the spikelet. Kunth Enum. Pl. 1. 482, eacl. Syn, Suppl. 396; Steud. Syn Gram. 399; Grah. Cat. Bomb. Pl. 219; Dalz & Gibs. Bomb. Fl. 304; Thw. Enum. Pl. Zeyl. 436; Trim. Cat. Ceyl. Pl. 108. Andropogon serratifolius, Herb. Heyne ex Wall. Cat. n. 8771 B. Themeda Cymbaria, Hack. Monogr. Androp. 668.—Anthistiria, Wall. Cat. n. 8771.

NILGHIRI HILLS, Wight, Schmid. Mysobe or the Caenatic, Herb. G. Thomson. Ceylon; Matelle East, Thwaites (C.P. 3257, 3803).

Perennial. Stem 3-8 ft., as thick as a swan's quill below, puberulous beneath the nodes. Leaves 2-4 ft. by 1-1 in., not overtopping the panicle, scaberulous above, glaucous beneath, margins scabrid; sheaths subcompressed, keeled; ligule very short. Panicle tall, 1-2 ft., branches smooth or scaberulous; spikes in oblong fascicles ½-1 m. long. Invol. spikelets, red or blueish, keels scabrid. Bisevual spikelets linear-oblong; gl. I shining below, scaberulous above; awn 4-3 in, slender.

9. A. anathera, Nees ex Royle Ill. Bot. Himal. 417 (name); upper leaves erect exceeding the elongate subsimple panicle, spikes few in pedicelled fascicles, involucr. spikelets  $\frac{1}{5}$  in., glumes 4, keels of gl. I with tubercle-based hairs, bisexual spikelets 2-3 linear-lanceolate not awned, keels of gl. I ciliolate. Steud. Syn. Gram. 402; Artch. Cat. Panjab Pl. 173; Duthie Grass. N.W. Ind. 23, Fodd. Grass. N. Ind. 42; Boiss. Fl. Orient. v. 460. Androscepia anathera, Anderss. in Nov. Act. Sc. Upsal. Ser. III. ii. (1856) 249. Themeda anathera, Hack. Monogr. Androp. 669.— Anthistiria, Wall. Cat. n. 8773.

WESTERN HIMALAYA; from Kashmir to Kumaon, alt. 4500-7000 ft., and to 9000 ft. in Garwhal, Duthie. - DISTRIB. Affghanistan.

Perennial. Stem ercct, 1-4 ft., slender, leafy. Leaves very narrow, 1-1 in. broad, rigid, glaucous, margins and upper surface scabrous, scaberulous beneath; sheaths glabrous; ligule oblong, obtuse. Panale 1-2 ft, narrow, glabrous; proper spathes 1-1 in., linear-lanceolate, acute. Spikes glabrous. Involucr. spikelets more or less hispid, one of each pair shortly stipitate.—Wallich's habitat for his n. 8773, "Bengal, near the Calcutta Bot. Garden," is either an error or the plant was an escape from cultivation. Andersson has two varieties, a. hirsuta, invol. spikelets wholly and pedicelled partially covered with tubercle-based hairs, and  $\beta$ . glabrescens, more glaucous, leaves pruinose, invol. spikelets dorsally glabrous or scabrous above, pedicelled glabrous.

- §§ Callus of bisexual spikelets acute.
- 10. A. Hookeri, Griseb. in Goetting. Nachr. (1868) 91; stem slender simple or sparingly branched above, spikes (with their proper sheath) axillary solitary long-peduncled glabrous, invol. spikelets  $\frac{1}{3} \frac{3}{3}$  in. sessile linear-lanceolate acuminate gls. 3, bisexual spikelets 1 or 2 scabrid above the middle dorsally rounded, awn  $\frac{3}{4}$ -1 in. A. gigantea subsp. caudata, in part, Hack. Monogr. Androp. 676. Androscepia glabrata, Anderss. in Herb. Kew.

SIKKIM HIMALAYA; interior ranges, alt. 6500-9000 ft., J. D. H., Gammie.

Stem 1-2 ft., shortly creeping at the base, erect or geniculately ascending, as thick as a crow-quill or less. Leaves very narrow, rarely 1/6 in. broad, quite smooth, subglaucous beneath, tips filiform; sheath smooth; ligule short ciliolate. Spikes axils in the long erect very slender leaves, rarely geminate in one short outer spathe, in. long, laterally compressed (without an outer spathe exceeding the proper), peduncle 1-2 in., filiform, enclosed sometimes up to the spike in a very slender spaths with a subulate tip; proper spathe linear-lanceolate, acuminate. Rachis of spike usually exceeding the invol. spikelets and proper spathe, nearly glabrous. Invol. spikelets quite glabrous, keels smooth, very narrowly winged. Bisexual spikelets like those of A. imberbs in form and colour of gl. I, and in the conic acute callus densely villous with rusty-red hairs; gl II scabrid towards the tip; awn geniculate, narrowed below to a capillary base; lodicules membranous. Pedicelled spikelets much longer than the bisexual, narrowly lanceolate, acuminate, glabrous, keels hardly scaberulous; pedicels slender, glabrous except at the base.—Though nearest allied to A. gigantea, which is a thoroughly tropical grass, this species most resembles A. imberbis, and especially its var Roylei, from which it is at once distinguished by wanting the long outer spathe, and by the superposed invol. spikelets.

11. A. gigantea, Cav. Ic. t. 36; tall, usually stout, spikes few in narrow pedicelled fascicles terminating the branches of a compound or decompound inclined or nodding rarely subsimple panicle, proper spather ather longer than the spikes, involucr. spikelets linear-lanceolate, one of each pair deciduous, bisexual spikelets 1-3 rufously hirsute dorsally channelled. Themeda gigantea, Hack. Monogr. Androp. 672.

LOWER HIMALAYA; from Kumaon eastwards, to Assam, Behar and the Khasia Hills, ascending to 4000 ft.—Distrib. China, Malaya, Australia, N. Caledon.

Stem 8-16 ft., often nearly 1 in. diam. below, erect, solid, terete, glabrous, simple below, branching above, leafy. Leaves 4-8 ft. by \(\frac{1}{2}\)-1 in., linear, setaceously acuminate, scaberulous above, glaucous beneath, margins scabridly serrulate, base narrowed, midrib broad, lower bifarious; lower sheaths compressed; ligule short, membranous, ciliolate. Panicle 1-3 ft, oblong, rarely simple, inclined, branchlets flexuous; spikes often pendulous; spathes narrowly cymbiform, keel and nerves scabrid. Spikes as long as the proper spathes or shorter; peduncle much shorter than the spathe, filiform, erect or divaricate. Invol. spikelets \(\frac{1}{2}\)-\frac{3}{2}\) in.; gl. I linear-lanceolate, setaceously acuminate, glabrous or hirsuite with fulvous hairs, keels scabrid; II shorter, acuminate, ciliate; III and IV still shorter, linear-oblong or lanceolate, ciliate. Bisexual spikelets \(\frac{1}{2}\)-\frac{1}{2}\) in., hinear-lanceolate; callus \(\frac{1}{2}\)-\frac{1}{2}\) in. villous with long brown hairs; gl I coriaceous, acute or acuminate, dorsally 1-3-channelled, more or less villously hirsuite all over or below the middle with brown hairs; II acute in the awnless spikelets, obtuse in the awned; III oblong-lanceolate, 1-nerved; IV = III, linear-lanceolate in the awnless spikelets, acute, 1-nerved in

the awned; IV the hyaline base of the awn.—Hackel classifies the form of this protean plant under 6 subspecies and 12 varieties. Of these the Indian (exclusive of intermediates) may be grouped as follows. They do not affect definite areas, and some of

them may be different states of one variety.

Subsp. genuna, Hack. 1. c. 672; panicle decompound, branches branchlets and peduncle of spike villous with rusty hairs, proper sheaths 1-1½ in., spikelets ½-½ in. or more dorsally hirsute with rusty-brown hairs, bisexual spikelets 1-3 in each raceme ½ in. awned or not. A. gigantea, Cav. l. c. A. vulpnna, Anderss. in Nov. Act. Sc. Upsal. III ii. (1856) 245. Andioscepia gigantea, var. a, Brongn. in Voy. Coq. Bot. 78; Kunth Enum. Pl. 1. 484 (eacl. Syn.). Calaminea gigantea, Roem. & Sch. Syst. ii. 810 (non Beauv.). Perobachne secunda, Presl. Rel. Hænk. i. 348, t. 48; Kunth L. c. 485.

Subsp. arundaracea (including subsp. intermedia), Hack. l. c. 674; panicle compound dense or lax, branches and branchlets glabrous, proper spathes  $1\frac{1}{2}-2$  in. chate, invol. spikelets  $\frac{1}{2}-\frac{2}{3}$  in. dorsally hirsute with golden or rusty hairs, bisexual spikelets I rarely 2 in each spike about  $\frac{1}{2}$  in long, awn  $1\frac{1}{2}-4$  in. A. arundanacea, Roxb. Fl. Ind. i. 251; Kunth Revis. Gram. i. 363, t. 95, Enum. 482, Suppl. 394; Steud. Syn. Gram. 401; Duthie Grass. N.W. Ind. 23, Fodd. Grass. N. Ind. 42. A. subsericans, Ness ex Steud. l. c. Cymbopogon arundinaceum, Schult Mant. ii. 457.—Anthistiria, Wall. Cat. n. 8763, 8772, 8774 B.—Subsp. intermedia, differs from arundinacea in the less hirsute male spikelet and in the awn reduced to a bristle.

Subsp. villosa, Hack. l. c.; panicle large decompound, branches and branchlets glabrous or scaberulous, proper spathes 1-1\frac{1}{2} in., spikes erect or divaricate, invol. spikelets \frac{1}{2} in. glabrous smooth or scaberulous, bisexual spikelets \frac{1}{2} in. grant in. or 0. A. villosa, Poir. Encycl. Suppl. i. 396; Lamk. Ill. t. 841, f. 3; Stewd. l. c. A. mutica, Stewd. l. c. Androscepia gigantea & mutica, Anderss. l. c. 248 (excl. Syn.), t. 3 (gigantea). Andr. gigantea, var. sundaica, Buese Pl. Jungh. i. 364. Aristaria mutica, Hassk. in Tijdschr. Nat. Gesch. x. 117, in Ann Sc. Nat. Ser. 3, iv. 178. Heterolytron scabrum, Jungh. l. c.—Anthistiria, Wall. Cat. n. 8776.—Assam, Khasia Hills, Malacca, Java.

Subsp. caudata & longispatha, Hack. l. c. 676, 677; panicle lax-fld. subsimple or decompound, branches and branchlets glabrous, proper spathes 1-1½ in., spikes often divergent, invol. spikelets ½-½ in., keels scabiid glabrous, bisexual spikelets 2-3 in each spike, awn ½ in. A. caudata, Nees in Hook. & Arn. Bot. Beech. Voy. 245; Steud. l. c. 402. Androscepia gigantea, var. himalayensis, Rupv. em Anderss. l. c. 248. Andr. gigantea, v. armata, Anderss. l. c.—Anthistiria, Wall. Cat. n.

8774 A.

Var. longispatha, Hack. l. c. 677; leaves glaucous beneath smooth except the scabrid margins, stems and sheaths quite glabrous, panicle broad compressed, branches scaberulous, pedicelled spikelets nearly smooth except the scabrid keels, involucr. spikelets about \(\frac{1}{4}\) in.—Terai of the Himalaya, Kuntze.—I have seen no authentic specimen.

### DOUBTFUL SPECIES.

ANTHISTIBIA sp.? an imperfect specimen from Chota Nagpur, Dr. Wood (Herb. Calcutt.) with the invol. gls. of A. gigantea, var. villosa, but with very broad leaves deeply cordate and amplexical at the base.

## 55. ISEILEMA, Hack.

Differs from Anthistiria in each spike being jointed below the involucral spikelets on the top of its peduncle, and falling away from it as a whole after flowering; whereas in Anthistiria the involucrant spikelets are persistent and the rest of the spike deciduous. In the former case, as Hackel observes, the dispersal of the species is by the wind, in the latter

by the callus of the bisexual spikelets piercing the skin or becoming otherwise attached to animals.—Species 5, tropical Asiatic and Australian.

- \* Keel and submarginal nerves of the spathes granulate or tubercled.
- 1. **I. Wightii,** Anderss. in Nov. Act. Soc. Sc. Upsal. Ser. 3, ii. 251; panicle decompound rather dense, spathes linear-lanceolate shorter or rather longer than the peduncle, invol. spikelets  $\frac{1}{8}$  in. almost concealing the bisexual. Hack. Monogr. Androp. 679; Lisboa in Journ. Bomb. Nat. Hist. Soc. vi. (1891) 218. Anthistiria prostrata, Willd. Sp. Pl. iv. 901; Roxb. Fl. Ind. i. 250. A. cimicina, Edgew. in Journ. As. Soc. Beng. (1852) 82 (in Bot. Zeit. (1852) 860); Steud. Syn. Gram. 400; Duthie Grass. N. V. Ind. 24. A. Wightii, Nees ex. Steud. l. c.; Duthie l. c. A. Linnæana, Steud. l. c. Andropogon prostratus, Linn. Mant. ii. 304. Cymbopogon glandulosus, Spreng Pugill. ii. 14.—Anthistiria, Wall Gat. n. 8770.

Throughout India; from the Panjab eastwards to Burma, and southwards to Malabar and Mysone.

Perennial, stem 6 to 3 ft., erect or base decumbent, rarely as stout at the base as a goose-quill, usually slender, nodes often bearded. Leaves 4-8 in., narrow, smooth or scaberulous, floral scabrid with tubercled margins, upper glabrous or hairy; ligule membranous, truncate. Panicle long or short, more or less compound; branches crowded or distant, strict or geniculate; nodes bearded; lower spathes foliaceous, floral \(\frac{1}{4}\)-\frac{1}{3} in., keels and margins tubercled. Involuer. spikelets male or neuter, pedicelled, oblong-lanceolate, gl. I 5-nibbed, scaberulous Bisexual spikelets, gl. I bicuspidate; II 3-nerved; IV a slender awn three times as long as the spikelet or longer.—Very variable in statue, length of leaves and habit of the panicle.

2. I. argutum, Anderss. l.c. 252, panicle linear elongate very lax, spathes elliptic-lanceolate about three times as long as the peduncle of the spike, invol. spikelets \(\frac{1}{2}\) in. shorter than the bisexual. Hack. Monogr. Androp. 681. Anthistiria arguta, Nees ex Steud. Syn. Gram. 401.—Anthistiria, Wall. Cat. n 8769.

BURMA; at Prome, Wallich.

Stem 2-3 tt., very slender, leafy at the base, compressed below. Leaves 3-6 in., narrowly linear, coriaceous, smooth except towards the spinulose rounded tips, deeply striate, midrib broad, floral with spinulose margins and ciliate base; sheath compressed; ligule a very short membrane. Panels almost filiform, flexuous, with distant almost capillary branches; nodes ciliate; spathes \( \frac{1}{2} - \frac{3}{2} \) in., keels and nerves granulate or tubercled. Invol. spilelets shortly stoutly pedicelled, linear-lanceolate; glumes 2, I 5-ribbed scaberulous, keels ciliate, tubercled; II 3-nerved. Biseaual spikelets linear-lanceolate; gl. I long-beaked, beak scabrid; IV a slender awn.—The materials are scanty; more specimens may modify the above characters.

- \*\* Keel and submarginal nerves of spathe not granulate or tubercled.
- 3. **I.** laxum, Huck. Monogr. Androp. 682; panicle slender, spikes erect, invol. spikelets with short filiform pedicels covering the fem. glumes 3 glabrous, bisexual spikelet narrowly lanceolate pedicelled glabrous. Duthie Fodd. Grass. N. Ind. 43; Lisboa in Journ. Bomb Nat. Hist. Soc. vi. (1891) 218. T. prostratum, Anderss. in Nov Act. Soc. Sc. Upsal. Ser. 3, in. 251 (excl. Syn.), t. 111. Anthistina prostrata, Willd., B glaucescens, Nees in Wight Cat. n. 1711 b Andropogon parviflorus, Herb. Wight ex Wall. Cat. 8767 C A. prostratum, Herb. Russ. ex Wall. Cat. l. c. D.—Anthistiria, Wall. Cat. n. 8767 A (in small part), B. C. D.

UPPER GANGETIC PLAIN; Patna, Wallich. The DECCAN PENINSULA, from the Concan southward, Wight, &c.

Stems tufted, 8-36 in., erect or ascending. Leaves narrow, 3-10 in., linear, obtuse, base chiate; sheaths lax; ligule membranous, truncate. Panicle flexuous, narrow; branches short, distant; spathes  $\frac{1}{4}$  in., elliptic-lanceolate, reddish, keel and nerves scabrid. Invol. spikelets  $\frac{1}{6}$  in., pedicels glabrous; gl. I oblong-lanceolate subacute, 5-nerved; II 3-nerved; III linear. Bisexual spikelets; pedicel chiate; gl. I chartaceous, lanceolate, acuminate, tip truncate; II acuminate, I-nerved; IV awn  $\frac{1}{2}$  in., very slender.

4. **I.** anthephoroides, Hack. Monogr. Androp. 683; panicle crowded leafy, racemes divergent, invol. spikelets very shortly broadly pedicelled glumes 2, I with 5 strong villous ribs, bisexual spikelet subsessile. Anthistiria prostrata, var. spic. masc. longe ciliatis, Wight Cat. n. 2335. Anthistiria, Wall. Cat. n. 8767 A.

The Southern Deccan Peninsula, Wight, &c.

Nearly allied to T. laxum, but a shorter stouter plant, with more crowded branches of the panicle and racemes.

### 551. PSEUDANTHISTIRIA, Hook. f.

Not in Clavis, p. 5.

Annual grasses, with the habits and characters of Anthistiria, but wanting the involucrant spikelets of that genus — DISTRIB. India.

Pseudanthistiria was regarded by Hackel as an anomalous section of his subgenus Hypogynium of Andropogon, with the habit of Anthistiria. As I have pointed out above (p. 168) it is a remarkably distinct genus of Andropogoneæ with characters totally at variance with those of Hypogynium as given in the "Monogr. Androp." I think that it is one of a natural group with Anthistiria, Iseilema, Heteropogon and Germainia. I am doubtful as to the specific vulue of some of the following, more copious material of all collected by good observers is wanting in this, as in so many other genera of grasses.

1. P. heteroclita, Hook. f.; leaves 6-12 in. linear glabrous or more or less chiate nerves distinct, fascicles of spikes about  $\frac{1}{2}$  in. broad, proper spathes  $\frac{1}{4}$  in. hardly longer than the spikes, sessile spikelets  $\frac{1}{8} - \frac{1}{6}$  in. hispidulous all over, awn  $\frac{2}{3}$  in. base lanceolate. Andropogon heteroclitus,  $Nees\ Fl$ . Afr. Austr. 115;  $Steud\ Syn$ . Gram. 389; Hack. Monogo. Androp. 400 A. monomeros,  $Hochst\ in\ Hohen$ . Pl. Ind. Or. n. 183. Anthistiria heteroclita, Roxb. Fl. Ind. 1. 249;  $Kunth\ Enum$ . Pl. i. 483.

BENGAL; pastures near Calcutta, Roxburgh. The Concan and Canaba, Law, Thomson, &c.

Stem 1-2 ft., geniculate, slender, rarely as thick as a crow-quill, smooth, subsimple or branched. Leaves \( \frac{1}{6} - \frac{1}{4} \) in broad, ciliate on both surfaces together with the sheaths and margins with long tubercled-based hairs in Calcutta specimens, nearly glabrous in Western ones, sheaths much shorter than the internodes; ligule short, membranous. Panicle not large, leafy, compound, with many shortly peduncled fuscicles; proper spather and pedicelled spikelets with a few long tubercle-based bristles; keel ciliate; base of awn linear-lanceolate.—I have seen no Bengal specimens, but the excellent figure in Roxburgh's "Icones pictæ" leaves no doubt in my mind as to its being of the same species as the western plant, only more copiously ciliate. A specimen in Herb. Kew from Hackel was communicated as Anthustiria tremula, the likeness between these two plants being so deceptive.

2. **P. hispida**, Hook, f; leaves 6-10 in linear and sheaths ciliate with long hairs or glabrescent, nerves distinct, fascicles of spikes  $\frac{3}{4}$  in broad copiously hisute with tubercle-based bristles, outer spathes  $1\frac{1}{4}-2$  in long,

proper spathes much longer than the spikes, sessile spikelets  $\frac{1}{6}$  in., gl. I terete glabrous except as to the scabrid summit, awn  $1-1\frac{1}{4}$  in.

The Concan, Stocks, Law, Dalsell, &c. CENTRAL PROVINCES; Khandwa,

Duthie (No. 8478).

- Stem 1-2 ft., rather stout, erect. Leaves  $\frac{1}{4}-\frac{1}{3}$  in. broad, base narrowed, scaberulous above and on the margins. Panacle elongate, simple, leafy.—Closely allied to P. heteroclita, and perhaps only a variety of it, but a stouter more hispid plant of a pale green colour, with much longer fascicles of spikelets with longer spathes and glabrous sessile spikelets.
- 3. **P. umbellata,** Hook. f.; stem filiform straggling, leaves 1-2 in. glabrous linear-oblong acute base rounded sessile or petiolulate, nerves very slender, fascicles of spikelets few axillary  $\frac{1}{4}$  in. broad with few sparingly ciliate spathes and spikes, outer spathes  $\frac{1}{2}$ -1 in., proper spather rother longer than the spikes, sessile spikelets  $\frac{1}{10}$ - $\frac{1}{8}$  in. scaberulous, pedicelled naked, awn  $\frac{1}{2}$ - $\frac{2}{3}$  in. Andropogon umbellatus, Hack. Monogr. Androp. 401. Anthistiria heteroclita,  $\beta$  foliis glabris, Wight Cat. n. 1706.

DECCAN PENINSULA, Wight; Cochin, Johnstone. CEYLON, Gardner, &c.

- A very slender glabrous plant, with prostrate creeping branched stems rooting at the nodes. Leaves distant, with a few scattered cilia on both surfaces, nearly smooth; sheaths shorter than the blade. Fusciles of spikelets axillary, glabrous or with a few tubercle-based cilia, on simple rarely branched capillary peduncles shorter than the leaves; lower peduncles sometimes elongate 1-3 in. long and bearing several fascicles; outer spathes \(\frac{1}{2}\)\frac{2}{3}\) in. long. Spikes 3-6 in a fascicle, proper spathe glabrous. Gl. I of sessile spikelet dorsally concave; base of awn as in P. heteroclita.
- 4. **P. burmanica**, Hook. f.; stem filiform straggling, leaves 1-2 in., linear-oblong or lanceolate glabrous, nerves very slender, fascicles of spikelets few axillary very narrow with few sparsely ciliate spathes and spikes, outer spathes  $1-1\frac{1}{2}$  in., proper spathes longer than the spikes, sessile spikelets  $\frac{1}{10}-\frac{1}{8}$  in. scaberulous, pedicelled naked, awn  $1-\frac{1}{2}$  in. base subulate-hastate.

PEGU, Kurz.

Habit of P. umbellata (of which it is possibly a variety) but leaves narrower, fascicles of spikelets  $1-\frac{1}{2}$  in. long, very narrow, with much longer awns, the base of which is suddenly dilated and hastate or sagittate at the dilatation.

# Tribe V. PHALARIDEE. (See p. 5.)

### 56. PHALARIS, Linn.

Annual or perennial grasses. Leaves flat. Spikelets 1-fld., in contracted or spiciform panicles, laterally compressed, rachilla with 1 or 2 minute scales (imperfect gls.) below gl. III, beyond which it is not produced, jointed at the base. Glumes (perfect) 3, I and II subequal, empty, persistent, keels winged or not; III much smaller, bisexual, 3-5-nerved, thin, at length corraceous; palea like the gl. 2-nerved. Lodicules 2. Stamens 3. Styles 2, free. Grain ovate or oblong, free within the gl.—Species 9 or 10 temperate and tropical.

The uppermost glume alone being flowering should technically refer this genus to the Series of Paneaceæ; but its affinities are with Poaceæ. P. canariemsis, Linn. (Canary Grass) is given as a N.W. India Grass by Duthie and others, but I have seen no specimens; it closely resembles P. minor, differing in the quite entire wings of the gls. P. paradoza, Linn. fil, is stated by Duthie Grass. N.W. Ind. to

be Indian on the authority of Wallich (Nepal), and Stewart (The Panjab); but in Fodd. Grass. N. Ind. he says that he has not seen specimens; nor have I. It is a Mediterranean plant.

- \* Phalaris proper. Spikelets in a dense cylindric or ovoid spiciform panicle; gls. I and II with winged keels.
- 1. P. minor, Retz. Obs. iii. 8; Kunth Enum. Pl. i. 32; Trin. Diss. ii. 254, Sp. Gram. Ic. t. 79; Steud. Syn. Gram. ii.; Wight Cat. n. 1738; Duthie Grass. N.W. Ind. 25, Fodd. Grass. N. Ind. 45; Aitchis. Cat. Panjab Pl. 158; Ledeb. Fl. Ross. iv 455; Boiss. Fl. Orient. v. 472. P. ambigua, Fig. & Notar. in Mem. Acad. Turin. Ser. II. xii. (1852) 326, t. 10, f. 6. P. aquatica, Ait. Hort Kew. i. 56. P. bulbosa, Desf. Fl. Atlant. i. 35 (non Linn.). P. canariensis, Wall. Cat. n. 3782 (non Linn.). P. capensis, Thunb. Prodr. Fl. Cap. 19. P. nepalensis, Trin. Sp. Gram. Ic. t. 80; Kunth l. c. 33; Steud. l. c. 10; Duthie l. c. Alopecurus otiporensis, Grif. Notul. iii. 94, Ic. Pl. Asiat. t. 143, f. 1.

Plains of WESTERN INDIA, and the HIMALAYA from Kashmir to Nepal, ascending

to 5000 ft.—DISTRIB. Westwd. to the Canaries, S. Africa, Austral.

Annual. Stem 1-3 ft., stout or slender, leafy. Leaves long, linear, acuminate; sheath smooth; ligule oblong, scarious. Panicle small and ovoid, or longer and cylindric,  $2\frac{1}{4}$ - $3\frac{1}{2}$  in. long by  $\frac{3}{4}$  in. diam, green. Spikelets  $\frac{1}{6}$  in. broad, very shortly pedicelled, shining; gls. I and II acuminate, wings irregularly crenate or serrulate; III ovate, acute, silky, with one bristle-like imperfect gl. at its base.

- \*\* DIAGRAPHIS, Trin. (Gen.). Spikelets in a thyrsiform panicle; gls. I. and II. not winged.
- 2. P. arundinacea, Linn. Sp. Pl. 55; Fl. Dan. t. 259; Host Gram. Austr. ii. t. 33; Engl. Bot. t. 2100; Kunth Enum. Pl. i. 33, Suppl. 23; Steud. Syn. Gram. 11; Boiss. Fl. Orient. v. 474. P. americana, Ell. Sketch. 1. 101. P. colorata, Beauv. Agrost. 172. P. intermedia, Bosc ex Poir. Encycl. Suppl. i. 300 P. picta, Hort. ex Steud. Nom. Ed. I. 609. Digraphis arundinacea, Trin. Fund. Agrost. 127; Ledeb. Fl. Ross. iv. 454. D. americana, Loud Hort. Brit. 27. Baldingera arundinacea, Dumort. Obs. Gram. Belg. 130. B. colorata, Gærtn. Mey. & Scherb. Fl. Wett. i. 96. Calamagrostis colorata, DC. Fl. Franc. iii. 26. Arundo colorata, Att. Hort. Kew. i. 116; Engl. Bot. t. 402; Knapp. Gram. Brit. i. 98.

KASHMIR; Wolar Lake, alt. 5550 ft., Falconer, &c.-Distrib. N. temp. and

Arctic regions.

Perennials. Rootstock creeping. Stems 2-6 ft., stout, erect. Leaves long, \(\frac{1}{3-\frac{1}{2}}\) in. broad, finely acuminate; sheaths smooth; ligule large. Panicle 4-8 in., suberect; branches 1-2 in., spreading in flower. Spikelets \(\frac{1}{6}\) in., densely crowded on the scabrid branchlets, very shortly pedicelled; gl. I and II glabrous, lanceolate, acuminate; I nerveless; II 3-nerved; III ovate-lanceolate, sparsely hairy, with 2 minute linear gls. on the rachilla. Lodicules silky.

### DOUBTFUL SPECIES.

P. PECTINATA, Roth. Nov. Sp. 34; Kunth Enum. Pl. i. 34; panicle cylindric spiciform, gl. I and II navicular margins membranous ciliate-pectinate, outer corolla 2-valved villous.

# 57. ANTHOXANTHUM, Linn.

Annual or perennial sweet-scented grasses. Spikelets 2-fid, narrow; in a spiciform panicle, persistent on the short pedicels. Glumes 5, I and II herbaceous, empty, persistent, acute or mucronate; I small, I-nerved; II longest, 3-nerved, III and IV very short, keeled, hairy, 2-fid, with a

dorsal bent awn; V fig., minute, hyaline, broad, obtuse, glabrous, awnless, 5-7-nerved; palea narrow. 1-nerved Lodicules 0. Anthers 2, large. Ovary glabrous, styles long. Grain terete, acute, free within the shining gl. and palea—Species 4 or 5, native of temperate regions.

A. ODORATUM, Linn. Sp. Pl. 28; Kunth Enum. Pl. i. 38, Suppl. 28, t. 8; Host Gram. Austr. t. 5; Fl Dan. 666, Reichb Ic. Fl. Germ. 106; T. Nees Gen. Fl. Germ. Monocol. i. t. 16; Knapp. Gram. Brit. t. 1; Enql. Bot. t. 617; Trin Sp. Gram Ic. t. 14, Ledeb. Fl. Ross. iv. 408; Boiss. Fl. Orient. v. 470.

Occasionally found in the Hill districts of INDIA, but only as introduced by

man or as an escape from cultivation.-Native of Europe and N. Asia.

Perennal, sweet-scented, especially when dry. Stem 6-18 in., tufted, erect or ascending. Leaves flat, harry. Panicle 1-5 in., pubescent or villous Spikelets \(\frac{1-3}{3}\) in, fascicled, sometimes squarrosely, green; gl. I ovate, acute; II lanceolate; III and IV curved, obliquely truncate.—The glumes are often described as 6. The sixth, though 1-nerved, is, I think a palea, analogous to the 1-nerved palea of Hierochloa and of a few other grasses, the nerves being theoretically formed of two confluent ones.

### 58. HIEROCHLOA, Gmel.

Perennial, erect, sweet-scented grasses. Leaves flat. Spikelets 1-3-fld., laterally compressed, panicled, not jointed or their pedicels, rachilla not produced above gl. V. Glumes 5; I and II equal or unequal, 1-3-nerved, hyaline or scarious, shining, keeled; III and IV usually similar, awned, 2-3-androus or neuter; palea 2-nerved or 0; V fem. or bisexual, palea 1-(rarely 2-) nerved. Lodicules 2, small. Anthers linear. Styles free. Grain oblong, free within the gls.—Species 8-10, of temp. and cold regions.

- \* Panicle effuse. Spikelets long-pedicelled; gl. III IV and V hirsute and ciliate, III and IV paleate, palea narrow, male; V smaller; rachilla produced between the gls.
- 1. **H. laxa**, Br. in Wall. Cat. n. 3796; leaves ensiform acute, spikelets \( \frac{1}{2} \) in. long, gl. I and II equal or subequal faintly nerved, III and IV truucate very shortly awned, V hirsute above the middle not awned. Duthie Grass, N.W. Ind. 25.

WESTEEN HIMALAYA, from Kashmir, alt. 10-12,000 ft, to Kumaon, alt. 12-16,000 ft.

Stem 1-2 ft., ascending from a stout creeping rootstock. Leanes 6-10 by \frac{1}{3}-\frac{1}{2} in., quite smooth; ligule large, oblong Panuele 3-5 in., lax, oblong, inclined; branches solitary or geminate and pedicels capillary. Spikelets much compressed, brown; gl. I 1-nerved; II faintly 3-nerved; IV sometimes fem. and diandrous; palea of V sometimes distinctly 2-nerved, but usually 1-nerved, more or less hispid.

2. **H. flexuosa**, *Hook. f.*; leaves narrowly linear, spikelets \(\frac{1}{4}\) in. long, gl. I and II subequal acuminate 3-nerved, III 2-toothed very shortly awned, III acutely 2-fid awn longer than the gl., IV not awned villous in the upper half, palea 1-nerved.

SIKKIM HIMALAYA; Bijean, King's Collector.

Stem 2-2½ ft., erect, very slender. Leaves about ½ in. broad; ligule oblong. Puncle 2-3 in. long and broad, very lax-fid.; rachis branches and pedicels all capillary and flexuous. Spikelets much compressed, brown; gl. I and II lanceo-

late, III and IV with a ring of hairs on the callus; V 5-nerved; palea 2-toothed, harry above the middle.

- \*\* Panicle contracted. Spikelets shortly pedicelled or sessile; gls. III and IV hirsute, paleate or epaleate, male or neuter; V much smaller, convolute, ovoid, glabrous, its palea linear, concave, 1-nerved; rachilla not produced between gl. II and IV.
- 3. **H. Hookeri**, Clarke mss.; spikelets  $\frac{1}{4}$  in long ovoid, gl. I and II very unequal acuminate, III shortly 2-fid shortly awned in the sinus paleate male, IV almost 2-partite epaleate neuter, segments lanceolate acute, awn in the sinus twice as long as the gl.—Ataxia Hookeri, Griseb. in Goett. Nachr. (1868) 77.
- E. NEPAL and SIKKIM HIMALAVA; in marshes, alt. 9-11,000 ft, J.D.H.,
- Stem 6 in. 2 ft., erect, ascending or geniculate below, sometimes as thick as a crow-quill. Leaves long, narrow, smooth; ligule oblong. Panicle 5-7 in. long; branches erect, subsecund; pedicels very short. Spikelets greenish; gl I 1-nerved; II 3-nerved; III and IV sessile; V stipitate, thiuly coriaceous, subacute.
- 4. **II.** gracillima, Hook. f.; very slender, panicle small, spikelets  $\frac{1}{5} \frac{1}{1}$  in. gl. I and II very unequal, III and IV epaleate neuter, III shortly bifid awn in the sinus very short, IV tip obtusely 2-toothed, awn nearly basal twice as long as the gl., palea of V 1-nerved.

SIRKIM HIMALAYA, alt. 10-11,000 ft., J. D. H.

A much more slender grass than H. Hookeri, with short very narrow leaves 2-4 in long, narrowed from the base to the tip. Panicle  $1\frac{1}{2}$ -2 in. long, drooping; rachis flexuous; branches very short and few-fld. Spikelets yellow or purplish, very shortly pedicelled.

5. **H. khasiana**, Clarke mss.; slender, panicle very narrow, spikelets \( \frac{1}{6} \) in. long ovoid, gl. I and II subequal acuminate, III and IV epaleate neuter, III 2-fid to the middle, awn in the sinus as long as the gl. or shorter, IV 2-fid to the middle awn exceeding the gl.

KHASIA HILLS, alt. 4500-6000 ft., Clarke.

Stem 1-2 ft., ascending from a shortly creeping base. Leaves 4-6 by \(\frac{1}{8}\)-\(\frac{1}{4}\) in., tapering from the base to the tip; ligule oblong. Panicle 1-4 in., very narrow; branches short, erect, few-fid. Spikelets greenish-brown, erect.

6. **H. Clarkei**, Hook. f.; tall, slender, panicle very narrow, spikelets in. long oblong, gl. I and II very unequal ovate-oblong acute, III shortly 2-fid shortly awned in the sinus paleate neuter, IV bifid to below the middle epaleate neuter, awn in the sinus twice as long as the gl.

KHASIA HILLS, at Lailan Kote, alt. 5500 ft., Clarke.

Stem 2 ft., slender, geniculate below. Leaves 6-8 by  $\frac{1}{6}-\frac{1}{4}$  in., narrowed from the base to the tip; ligule short. Panule as in H. khastana, but spikelets nearly twice as large and narrower in proportion, and gl. IV with a long exserted awn.

# Tribe VI. AGROSTIDEÆ. (See p. 5.)

# 59. ARISTIDA, Linn.

Annual or perennial grasses. Leaves usually convolute. Spikelets panicled, 1-fid., rachilla (or callus of fl. gl.) articulate at the base. Glumes 3, I and II empty, very narrow, keeled, persistent; III narrow, rigid,

cylindric, convolute, acuminate, tip produced into a long 3-partite (very rarely simple) naked or feathery awn twisted below the branches; palea very narrow, embraced by the gl., sometimes minute or 0. Lodicules 2. Stamens 3. Styles distinct. Grain narrow, free within the closely convolute gl.—Species (assumed) about 100, natives of warm countries.

The species and synonymy as given below have been revised by Dr. Stapf with the Oriental and African.

- Sect. I. CHETARIA. Awn tripartite from the base, not or imperfectly articulate with the top of the gl., persistent, glabrous.
- 1. A. Cumingiana, Trin. & Rupr. in Mem. Acad Petersb. Ser. VI. vii. (1849) 134; annual, dwarf, panicle very slender, spikelets (without the awns)  $\frac{1}{12} \frac{1}{10}$  in., awn inarticulate at the base. Steud. Syn. Gram. 140; Mig. Fl. Ind. Bat. iii. 381; Hance in Journ. Linn. Soc. xiii. (1873) 135. A. capillacea, Cav. Ic. v. 43, t. 468, f. 1 (non Lamk.); Steud. l. c. 134. A. delicatula, Hochst ex A Rich. Tent. Fl. Abyss. ii. 293; Steud. l. c. 139. A. tenella, Kurz in Herb. Calcutt. A. trichodes, Walp. Ann. iii. 753; Mig. l. c. 380; Steud. l. c. 140. Chætaria trichodes, Nees in Hook. Kew Journ. ii. (1850) 101.

W. BENGAL, Kutz. CHOTA NAGPORE, Clarke. PEGU, Kurz; on the Shan

Hills, Collett.—DISTRIB. China, Philippines, Afr. trop.

Stem 3-10 in., tufted, very slender. Leaves filiform. Panicle subcylindric, narrow, loosely branched, rachis branches and pedicels capillary, scaberulous. Spikelets green or purplish; gls. acuminate, II longest; III as long as I, scaberulous; arms of awn twice as long as the gls., capillary, median longest.

2. A. Adscenscionis, Linn. Sp. Pl. 82 (excl. Syn. Sloane); annual or perennial, panicle contracted, branches short or elongate and naked below, spikelets (excl awns) \(\frac{1}{2-\frac{1}{3}}\) in. acute, gl. I acuminate not awned, II obtuse or emarginate and mucronate, awn inarticulate at the base. Kunth Enum. Pl. i. 190; Steud. Syn. Gram. 139.

Throughout the Plains and low Hills of INDIA, BURMA and CEYLON,

ascending to 8000 ft. in Kashmir.—DISTRIB. Most warm countries.

Stems 6 in. —3 ft., tufted, usually almost filiform, rarely as thick as a crow-quill, smooth. Leaves very narrow, smooth or scaberulous. Pancle 3-12 in., subsimple or compound, rachis and capillary branches nearly smooth; branches very short with subsessile fascicles of spikelets, or longer, and erect or spreading. Spikelets pale green or purplish; gl. I  $\frac{1}{6}$ - $\frac{1}{6}$  in., acute, II  $\frac{1}{6}$ - $\frac{3}{6}$  in., smooth or scabrid; middle branch of awn  $\frac{1}{3}$ - $\frac{3}{6}$  in., rarely 1 in.

Dr. Stapf, who has reviewed the whole genus, informs me that besides the following synonyms, which apply to Old World forms, there are in the New World 11 others

under Anstida, and 14 under Chataria.

Var. typica, Stapf. mss.; gl. III about as long as II. A. abyssinica, Trin. & Rupr. in Mem. Acad. Petersb. Ser. VI. vii. (1849) 134. A. carnlescens, Desf. Fl. Atlant. i. 109, t. 21, f. 2; Kunth l. c. 191, Suppl. 146; Steud. l. c. 138. Boiss. Fl. Orient. v. 491; Duthie Grass. N. W. Ind. 26. A. canarieniss, Willd. Enum. Pl. 99. A. chestophylla, modatica, simplicissima & Teneriffæ, Steud. l. c. 139, 420. A. curvata, Nees ex A. Rich. Tent. Fl. Abyss. ii. 392. A. depressa, Retz. Obs. iv. 22; Roxb. Fl. Ind i. 351; Wall. Cat. n. 3786; Kunth. l. c. 190, Suppl. 146; Thw. Enum. Pl. Zeyl. 370; Trum. Cat. Ceyl. Pl. 108; Dalz. & Gibs. Bomb. Fl. 295; Astch. Cat. Panjab Pl. 164 (excl. Syn. setacea); Benth. Fl. Austral. vii. 563; Duthie l. c. & Fodd. Grass. N. Ind. 47, t. 30. A. divaricata, Jacq. Eclog. Gram. 7, t. 6 (non Willd). A. elatior, Cav. Ic. vi. 65, t. 589, f. 1; Kunth l. c. i. 191. A. festucoides, Hochst. et Steud. ex Trun. & Rupr. (non Poir.). A.

gigantea, Linn. f. Suppl. 113; Kunth l c. 194, Suppl. 150. A. Jacquiniana, Tausch. in Flora (1836) 508. A. Heymanni, Regel in Act. Hort. Petrop. vii. (1880) 649. A. Hystrix, Duthie Fodd. Grass. N. Ind. 47, t. 31 (not of Linn, fil). A. nutans, Willd. Hort. Berol. ex Steud. Nomencl. Ed. II. 1. 131. A. paniculata, Forsk. Fl Æg Arab. 25 (ex descript.). A. pusilla, Trin. et Rupr. in Mem. Acad. Petersb. Ser. VI. vii. (1849) 140. A. setacea, Trin. l. c. i. (1831) 84 (non Retz.); Wall. Cat. n. 3785; Steud. l c. 139. A. vulgaris, Trin. & Rupr. in Mem. Acad. Petersb. l. c. 131 (with 10 vais.) Steud. l c. 138 Chætaria Ascenscionis, cærulescens, canariensis, depressa, elatior, & gigautea, Beauv. Agrost. 30 C curvata & mauritiana, Nees Fl. Afr. Austr. 186, 188. C. Hystrix, Wight Cat. n. 1787 (non Beauv.).

Var. A. æthiopica, Trin. & Rupr. l.c. 167. A. Ehrenbergii, Tiin. & Rupr. Strpac. 136; Stevid l.c. 138. A. festucoides, Poir. Encycl. Suppl. 1. 453 (ew Trin.); Kunth Enum. Pl. i. 197. A. mutabilis, var. æquilonga, Trin. & Rupr. in Mem. Acad. Petersb. Ser VI vii. (1849) 150. A. pumila, Dene in Ann. Sc Nat. Ser. II. iv. (1835) 85; Boiss. l.c. 496; Steud. l.c. 138. A. spicigera, Trin. & Rupr. l.c. in part (with 6 vars.).

-Aristida Wall. Cat. n. 3788.

3. A. setacea, Retz. Obs. iv. 22; perennial, panicle contracted, spikelets (excl. awn) ½-3 in, gl. I and II long-awned, awn inarticulate at the base, middle branch ½-1½ in. Kunth Enum. Pl. i 191 (excl. Syn. depressa), Suppl. 148; Steud. Syn. Gram. 141; Roxb. Fl. Ind. 1. 349; Wall. Cat. n. 3785 A. B in part); Grah. Cat. Bomb. Pl. 218; Dalz. & Gibs. Bomb. Fl. 295; Duthie Grass. N. W. Ind. 27. A. adscendens, Trim. Cat. Ceyl Pl. 108. A. arundinacea, Roem. ex. Retz. l. c. (non Linn.). A. cerulescens, Thw. Enum Pl. Zeyl 370 A. Hystrix, Baker Fl. Maurit. 451 (excl. Syn.). A. quinqueseta, Steud. l. c. 420. Chætaria setacea, Beauv. Agrost. 36. C. depressa, Herb. Wight propr. n. 1735.

WESTERN INDIA; from Behar and the Concan southwd. CEYLON; Walker, &c.—DISTEIB. Mascarene Islds.

Stem 3-4 ft., sometimes as thick at the base as a goose-quill, stout, erect, simple, or subfastigiately branched with open sheaths at the ramifications. Leaves filiform, convolute, scaberulous. Pancels 6-12 in., inclined; branches short, subsecund, scaberulous, usually fascicled and erect. Spikelets green or purplish; gl. I narrowed into a short awn; 2 minutely 2-toothed, awn short; III nearly smooth; beard of callus copious, white, silky.

4. A. cyanantha, Steud. Nom. Ed. II. i. 131; Syn. Gram. 141; tall stout, panicle effuse, branches flexuous widely spreading, spikelets (excl. awns)  $\frac{1}{3} - \frac{1}{2}$  in., gls. I and II shortly awned, awn of III not articulate with the gl. branches very long flexuous middle one up to  $2\frac{1}{2}$  in. Trin. in Act. Acad. Sc. Petrop Ser. VI. v. (1842) 150; Boiss. Fl. Orient v. 492; Duthie Grass. N.W. Ind. 26 (excl. Syn.). Chaetaria cyanantha, Nees in Royle Ill. Bot. Himal. 424.

WESTERN HIMALAYA, alt. 3-5000 ft., from Kashmir to Kumaon; and low hills

of the Panjab.—Distrib. Affghanistan.

Perennial. Stem 3-6 ft., attaining the thickness of a swan's quill below. Leaves 6-12 by  $\frac{1}{5}$ - $\frac{1}{5}$  in., at length convolute, quite smooth, glaucous; sheaths smooth. Panicle 12-18 in., very variable in amount of branching; branches 4-12 in., solitary or 2-3-nate, usually naked for 2-6 in., scaberulous. Spikelets usually dark purple; gls. I and II with nearly smooth keels, tip of II fimbriately toothed; III, callus hairs very few; awn minutely scaberulous.

5. A. Hystrix, Linn. f. Suppl. 113; perennial, panicle as broad as long branches distant rigid widely spreading, spikelets (excl. awns) \( \frac{1}{3} - \frac{3}{4} \) in., vol. vii.

gls. I and II. finely acuminate or awned, awn of III not articulate with the gl. branches very long rigidly flexuous middle one 1-2 in. Trin. Diss. i. 187, in Act. Petrop (1829) 83, (1836) 47; Kunth Enum Pl. i. 350, Suppl. 147; Roxb. Fl Ind i. 350; Wall. Cat. n. 3784, Grah. Cat. Bomb Pl 335; Dalz & Gibs. Bomb. Fl 295; Steud. Syn Gram 141 A triplis, Thunb. Fl. Ceyl. Diss. 2, ex Trin. & Rupr. in Mem Acad. Petersb. Ser. VI. vii. (1849) 147. Chaetaria Hystrix, Beauv. Agrost. 30.

The DECCAN PENINSULA, from the Concan and Central Provinces southward.

CEYLON (Thunberg).

Stem 6 in.-2 ft, as thick as a crow-quill or less, stiff, stout and erect or long inclined or prostrate and proliferously branched with open sheaths at the ramifications. Leaves 2-4 in., narrow, convolute, glaucous. Panicle 4-6 in.; rachis stout flexuous and angular, branches and branchlets smooth and II membranous or subchartaceous, keels smooth; II most minutely toothed at the base of the awn; III smooth, callus naked, awns most minutely scaberulous—I have seen no Ceylon specimens, for which habitat Thunberg (fid. Trinius) is the authority.

6. A. mutabilis, Trin. & Rupr. in Mem. Acad. Petersb Ser. VI. vii. (1849) 150 (excl. var. æquilonga); annual, pantole very narrow subcylindric, branches very short crowded, spikelets (excl. awns) ½ in., gls. I and II shortly awned, awn of III obscurely articulate with the gl., column long, branches rather short, middle one about ½ in. Steud. Syn. Gram. 141. A. articulata, Edgew in Journ. Linn Soc. vi. (1862) 209; Aitch. Cat. Panjab Pl. 164; Duthre Grass. N.W. Ind. 26, Fodd. Grass. N. Ind. 47. A. Kunthiaua & meccana, Trin & Rupr. l c 151 (ex descr) 152, Steud l. c. 141. A. Schweinfurthi. Boiss. Fl. Orient. v. 493. A. spicata, Rottl. mss. A. tenuis, Hochst in Flora, xxviii. (1855) 200.

The Panjab & Rajpootana; Multan, Edgeworth; Jodhpore, King. Southern

INDIA, Heyne, Wight, &c .- DISTRIB. Arabia, Africa trop.

Stems 6-12 in, many ascending from the root, simple or proliferously branched, slender. Leaves 1-3 in., very slender, curved, convolute, rigid, smooth. Panules 3-6 in., branches all very short and crowded, or with sometimes a few remote lower down or the stem ascending from a naked base and bearing a dense oblong fascicle of spikelets, rachis smooth, branches scaberulous. Spikelets very shortly pedicelled, pale green or straw-colrd.; gl. 1 \( \frac{1}{2} \) in., keel scaberulous; II \( \frac{1}{4} \) in., tip 2-toothed below the awn; III scaberulous, callus shortly bearded; column of awn nearly as long as the gl, slender, smooth, branches capillary.—King's specimens from Jodhpore are in a starved state and mixed with \( A.\) Adscenscions.

- Sect. II. ARTHRATHERUM. Column of awn long, twisted, articulate on the glume (obscurely in A. redacta), branches glabrous, rarely 0.
- 7. A. funiculata, Trin. & Rupr. in Mem. Acad. Petersb. Ser. VI. vii. (1849) 159; annual, very slender, paniele lax narrow, branches very short, gls. I and II \(\frac{1}{2}\)-1 in. subequal awned, column of awn I in. or less, branches capillary 1-3 in. Steud. Syn. Gram. 142; Aitchis. Cat. Panyab Pl. 164; Boiss. Fl Orient. v. 492 (in part); Duthie Fodd. Grass. N. Ind. 47. A. funicularis, Trin. ex Steud. Nomencl. Ed. II. i. 131; Edgew. in Journ As. Soc Beng. xxi. (1852) 160, 163 (teenicularis). A. Kotschyi, Hochst. ex Steud. Syn. Gram. 142. A. macrathera, A. Rich. Tent. Fl. Abyss. ii. 393; Steud. l. c. 142; Boiss. l. c. 493 (macranthera). A. mallica, Edgew. in Journ. Linn. Soc. vi. (1862) 209; Aitch. l. c.; Duthie l. l. c. c. A. murina, Aitchis. l.c. 164 (non Cav); Duthie Grass. N.W. Ind. 26. A. paradoxa, Schmidt Fl Cap. Verd. 140. A. pilosa, Herb. Heyne (non Labill.). A. Royleana, Trin. & Rupr. in Mem. Acad. Petersb.

VI. vii. (1849) 160; Lisboa in Journ Bomb. Nat. Hist. Soc. vii (1892) 358. A. stipacea, Ehrenb. & Hempr. ex Trin. & Rupr. l. c. Chaetaria murina, Nees ex Trin. & Rupr. l. c. 160. C. murina, \(\beta\). villosa, Nees ex Wight Cat. n. 1736. C. Royleana, Nees ex Steud. Syn. Gram. 143. Arthratherum Kotschyi, Hochst. ex Trin l. c.—Aristida, Wall. Cat. n. 3787.

Plains of the PANJAB from the Sutley westward. RAJPOOTANA, and from the

CONCAN southward - DISTBIB Beluchistan, Arabia, Trop. Africa

Stems many, geniculately ascending, 10 in.-2 ft. Leaves very slender, flat or convolute, base chiate with long hairs. Panicle 4-10 in., branches erect capillary. Spikelets variable in length, pale; gl. I rather shorter than II, keels scaberulous; III smooth, callus sparsely bearded or naked; column of awn very slender, minutely scaberulous, twisted, branches straight capillary.

Var. Royleana, leaves eciliate, spikelets smaller, on more distant spreading flexuous branches, gl. I  $\frac{1}{2}$  in, or less, column of awn  $\frac{1}{3}$  in, branches more unequal, longest  $\frac{3}{4}$  in —A. Royleana, Trin. & Rupr. l.c. 160; Steud. l.c. 143. Chaetaria Royleana, Nees en Steud. l.c. Arthratherum Royleanum, Edgew. en Artchis. l.c.

-The Panjab, Kangra, alt 3000 ft., Clarke.

Var. ? Stocksn; gl. I = 1 II.—Concan? Herb. Stocks.

8. A. hystricula, Edgew. in Journ. Linn. Soc. vi. (1862) 208; dwarf, very slender, 1-2 in. high, panicle very small narrow much shorter than the awns, gls. I and II  $\frac{1}{5}$  in. subequal or I shorter aristately acummate, column of awn  $\frac{1}{4}$  in. twisted, branches subequal  $\frac{1}{3} - \frac{3}{3}$  in. Artchis. Cat. Panyab Pl. 164; Duthie Grass. N.W. Ind. 26, Fodd. Grass. N. Ind. 47. A. funiculata, Boiss. Fl. Orient. v. 493 (the Beluchist plant only).

The Panjab; Multan, Edgeworth. Scind; near Kurruchee, Stocks.—Distrib. Beluchistan.

Annual. Stems very many from the root, \( \frac{1}{2}-1 \) in., densely crowded. Leaves subulate, curved, convolute, acuminate, glabrous. Panicle without the awns \( \frac{1}{2}-1 \) in.; branches few, short, erect. Spikelets erect; gls. I and II very narrow; callus of III minute, glabrous; column of awn capillary, twisted, smooth, branches of extreme tenuity.

9. A. redacta, Stapf in Kew Bullet. (1892) 85; stems tufted, tall or short, panicle large effuse, branches spreading, gls. I and II subequal shortly awned about ½ in. long, II deciduous, column of awn capillary twisted. branches 0 or very short. A. depressa, Retz. Herb. Ind. Or. Hf. & T. in part. Stipa aristoides, Stapf ex Lisboa in Journ. Bomb. Nat. Hist. Soc. vii. (1892) 358.

LOWER BENGAL; Burdwan, Clarke. The CONCAN, CENTRAL INDIA, and the

CENTRAL PROVINCES, Stocks, Law, &c. - DISTRIB. S. Persia.

Annual. Stems 6 in.-2 ft, rather stout or slender, densely tufted, simple, or proliferously branched in robust specimens. Leaves 4-8 in., very slender, convolute, ciliate with long hairs at the base. Panicle 6-12 in., rachis slender smooth; branches usually binate, capillary, flexuous, smooth, erect or spreading, each with one or few spikelets Spikelets on short or long capillary pedicels, green or purplish; column of awn gradually dilating below, 3-nerved, convolute and passing into the glume from the top of which it separates readily but without an indication of the joint.

Sect. III. STIPAGROSTIS. Awn feathery.

10. A. hirtigluma, Steud. Non. Ed. II. ii. 231, Syn. Gram. 144; very slender, panicle narrow strict or flexuous, branches very short, gl. I and II unequal, III muriculate, awn capillary plumose middle branch  $1\frac{1}{2}$  in. lateral much shorter naked of extreme tenuity. Trin. & Rupr. in Mem. Acad. Petersb. Ser. VI. v. (1842) 171; Aitchis. Cat. Panjab Pl. 164,

Duthie Grass. N.W. Ind. 26, Fodd. Grass. N Ind. 47; Boiss Fl. Orient. v. 496 A. ciliata, Steud & Hochst. ex Steud Nom Ed. II. i 131 (non Desf). A. decorata, Stevd. Syn Grum 421. A paradises, Edgew. in Journ As. A. decorata, New New 1219. A. pogonoptila, Boiss. l. c. A. Schimperi, Hochst et Steud. ex Steud l. c. 143. Arthratherum cilatum, Nees in Linnea, vii (1832) 287, Fl. Afr Austr i. 182. Arth elatum, Boiss Diagn. Ser. II vv. 128. Arth. hirtiglume & pogonoptilum, Jaub. & Spach, Ill. Pl. Orient. iv. 52, 56. Arth. Schimperi, Nees Fl. Afr. Austr. 178.

The Panjab, Jacquemont, Falconer, &c. Peshawur, &c., Stewart. Scind, Herb. Calcutt. - Distrib Westward to Egypt and Abyssinia.

Perennial. Stem stout at the base, slender and 1-2 ft. high. Leaves 3-8 in, convolute, filiform, flexuous, tips capillary. Panicle very slender, branches very short, erect, capillary Spikelets pale green or straw-colrd.; gls I and II not or hardly awned, harry or glabrous; I in.; II rather shorter; III muriculate, callus bearded; awn straight, articulate in the gl., column twisted, plumose as well as the middle branch.

11 A. plumosa, Linn. Sp. Pl. Ed. II. 1666; stem slender, panicle narrow, branches very short, gls. I and II subequal, III glabrous smooth, awn capillary middle branch 2-3 in. plumose above naked below, lateral much shorter naked of extreme tenuity. Vahl Symb. 1 11, t. 3, Trin. Dess i 181, ii. 26, in Act. Petrop. (1829) 89, Trin. & Rupr l c. Ser VI v. (1842) 165; Kunth Enum. Pl. i. 195, ii. 151; Steud Syn. Gram 143; Attchis. Cat. Panjab Pl. 164; Boiss. Fl Orient. v. 495, Duthie Grass. N.W. Ind. 26, Fold. Grass. N Ind. 47. A. biachypoda & Forskahli, Tausch. in Flora (1830) 506; Boiss, l. c 495, 496 A. lanata, Forsk Fl. Egypt. Arab. 25 A. Raddiana, Sair in Mem. Moden (1837) 198; Steud. l c. 144. Arthratherum plumosum, Nees Fl. Afr. Austr. 1. 182.

WESTERN TIBET; Iskardo, alt. 7700 ft., Clarke. - DISTRIB, Turkestan, Persia. N. Africa.

Perennial. Stem 1-2 ft., from a stout branching woody stock with stout rigid Leaves 2-6 in , rigid, filiform, convolute, flexuous. Panicle 2-3 in. (excl. the awns) very narrow. Spikelets erect; gls I and II in., not awned; III callus hearded, column of awn 1 in., very slender, hardly twisted, glabrous; middle branch strict, silvery, lower 1 naked, lateral about 1 in. long.

### UNDETERMINABLE SPECIES.

A. RIGNESCENS, Roem. & Schult. Syst. ii 400; Steud. Syn Gram. 141. A. rigida, Heyne ex Roth. Nov. Sp 42 (non Cav); Kunth Enum. Pl i. 197. Arthratherum rigidum, Schult Mant ni. 212) .- May be A. Hystrix.

# 60. STIPA. Linn.

Tufted perennial grasses. Leaves usually convolute Spikelets loosely panicled, terete, 1-fid., rarely dorsally compressed, rachilla forming a thickened or narrow callus below gl. III. Glumes 3, I and II empty, persistent, keeled, acute, rarely awned. III rigid, convolute, terete, narrowed into an entire or notched or 2-fid tip, with a long terminal bent usually deciduous awn, column of awn twisted rarely straight; palea 2nerved, closely embraced by the gl. Lodicules 3, large. Stamens 1-3, tips of anther cells bearded or naked. Grain narrow, terete, free within but tightly embraced by the gl. and palea.—Sp. about 100, temperate and tropical.

Dr. Stapf has aided me greatly in this difficult genus.

- A. Column of awn twisted.
- \* Awn plumose or hairy throughout its length or nearly so.
- 1. S. orientalis, Trin. ex Ledeb. Fl Alt i 83; panicle narrow more or less embraced by the dilated sheath of the uppermost leat, spikelets ½ in., gls. I and II about twice as long as the silkily hairy III. Ledeb. Ic. Fl. Ross. t. 223; Trin in Act Acad Petersb. VI 1. (1830) 79; Kunth Enum. Pl. 1. 185, Steud Syn. Gram. 131: Boiss. Fl. Orient. v. 504; Duthie Grass. N.W. Ind. 27. S. Semenovii, Krassii. Descr. Pl. Thiansch. in Script. Bot. Hort. Univ. Petrop. ii. 22. S. Szovitziana, Duthie l. c. 27 (non Trin.). S. tartarica, Jacquem. mss.

WESTERN TIBET, alt. 10-15,000 ft., Jacquemont, &c.-DISTRIB. Westward to Persia. Altai Mts.

Stems 6-14 m., forming dense hard tufts, clothed below with shining sheaths. Leaves 4-10 m., filiform, tips long capillary; sheath of uppermost, 4-6 by  $\frac{1}{6}$ - $\frac{1}{4}$  m. broad. Panacle elongate, branches and pedicels short, erect. Gls. I and II hyaline,  $\frac{1}{3}$ - $\frac{1}{2}$  in. long, tips slender; I 1-nerved or 3-nerved at the base; II 3-nerved; III cylindric, callus = about  $\frac{1}{3}$  of the gl, bearded; awn plumose throughout its length, nearly straight, column about  $\frac{1}{2}$  of its length.—Probably a form of S. barbata. Said to be the commonest grass on the Pamir.

2. S. basi-plumosa, Munro mss.; panicle very narrow, branches and pedicels very short, spikelets purple, gl. I and II  $\frac{1}{4}$ - $\frac{1}{8}$  in , III about  $\frac{1}{3}$  shorter than II sparsely hairy, awn capillary twice or thrice as long as the spikelet very densely bearded towards the base.

WESTERN TIBET; Nubra, and the Lanak Pass, alt. 15-17,000 ft, Thomson.

Stems 6-16 m., densely tufted, slender, strict. Leaves 4-6 m., convolute, filitorm, slightly scabrid. Panicle 2-6 m., sometimes sheathed; branches and spikelets distant; gl. I and II ovate-lanceolate finely acuminate, tip and margins white hyaline; I 3-nerved at the base; II 3-nerved; callus of IV = about dot the gl; awn very delicately plumose upwards with spreading hairs, column slightly twisted.

Var. longe-aristata, Munro mss.; gl. I and II 1 in., awn 12 in.—Western Tibet, Thomson

3. S. purpurea, Griseb. in Goett. Nachr. (1868) 82; spikelets few purple on long capillary sigmoidly flexuous pedicels, gl. I and II  $\frac{2}{3}-1$  in., III about  $\frac{1}{3}$  shorter than II softly hairy, awn  $2\frac{1}{3}-3$  in. flexuous. S. Richteriana, Herb. Ind. Or. Hf. T.; Duthre Grass. N.W. Ind. 27 (not Kar. & Kir.). Lasiagrostis tremula, Ruprecht Sert. Thiansch. 35.

WISTERN TIBET; Gnari Khorsum, alt 17,000 ft., Schlagintweit; Lake Rukshun, 15,000 ft., Lance.—DISTRIB Thianschal Mts., in Central Tibet, alt. 16,000 ft., Thorold.

Stems densely tufted, 6-10 in., filiform, sheathed below the panicle. Leaves 2-4 in., filiform, convolute; ligule elongate. Spikelets very few, hardly forming a panicle, branches and pedicels \( \frac{1}{2} \) in., or more, sometimes zigzag. Gls. I and II narrowly lanceolate, dark purple with slender hyalme tips, III callus = \( \frac{1}{6} \) of the gl., villous. Auther-tips nalsed.

4. S. mongolica, Turcs. ex Trin. in Bull. Sc. Acad. Petersb. 1. (1836) 67, panicle open with few distant widely spreading capillary flexuous branches, spikelets  $\frac{1}{8}-\frac{1}{6}$  in. ovate dorsally compressed, gls. I and II purple below the middle hyaline above it, III hairy, awn about twice as long as the gls. Steud. Syn. Gram 132; Duthie Grass. N.W. Ihd 27. Lasiagrostis mongholica, Trin. ex Rupr. in Mem. Acad. Petersb. Ser. VI. Sc.

Nat. v. (1842) 87. L. alpina, F. Schmidt Reise Amurl. 73. Ptilagrostis mongholica, Griseb. in Ledeb. Fl. Ross. iv. 447, in Goett. Nachr. (1868) 82.

ALPINE HIMALAYA; Kumaon, alt. 14,000 ft., Strackey & Winterbottom. N. Sikkim, alt. 14-16,000 ft., J. D. H. Western Tibet; Ladak, alt. 13,000 ft.,

Thomson, Lance.—DISTRIB. Altai Mts. Mongolia.

Stems 1-2 ft., densely tufted, very slender. Leaves 4-6 in., almost capillary, flexuous. Pancle 4-6 in, branches solitary, lower 1-3 branching at the ends. Spikelets ovoid, pedicels \( \frac{1}{4} \) in.; gls. I and II oblong-lanceolate, acute; I 1-nerved or 3-nerved below; II nerves 3, very slender; III about \( \frac{1}{4} \) shorter than II, hairy all over; awn twice as long as the spikelets or more, hairy to the tip. Anther-cells with bearded tips.

5. **S. concinna**, Hook. f; panicle small few-fid. contracted, branches and pedicels short erect, spikelets  $\frac{1}{4}$  in. ovoid dorsally compressed purple, gls. I and II ovate acute tips hyaline, III glabrous, awn about twice as long as its gl.

SIKKIM HIMALAYA, in the Tibetan Region, alt. 14-16,000 ft., J. D. H.

Stem 6-10 in., rather stout. Leaves 2-4 in., filtform, flexuous Panicle 1-1; in., solitary, branches and pedicels erect. Gl. I and II acummate; I 1-nerved II 3-nerved; awn harry to the tip. Anther cells with bearded tips.

- \*\* Awn plumose above the column only.
- 6. S. pennata, Linn. Sp. Pl. 78; panicle narrow sheathed, gl. I and II subequal cuspidately awned, III = \frac{1}{3} II glabrous above, awn 6-9 in. flexuous plumose above the column only. Host Gram. Austr. iv. 19, t. 33; Engl. Bot. t. 1356; Trin. in Act. Petrop. (1829) 32; Trin. & Rupr. l c. vii. (1842) 80; Kunth Enum. Pl. i. 179; Reichb. Ic. Fl. Germ. 46; T. Nees Gen. Fl. Germ. Monocot. i. n. 26; Ledeb. Fl. Ros. iv 450; Boiss Fl. Orient. v. 502. S aperta, appendiculata, gallica & tauricola, Janka ex Celak in Estr. Bot. Zeitschr. xxxiii. (1883) 317, 319, 349. S. eriocaulis, Borb. in Estr. Bot Zeitschr. xxxiii. (1883) 401. S. Grafiana, & Tirsa, Ster. in Bull. Soc. Nat. Mosc. xxx. ii. 115, 116. S. pulcherrima, C. Koch in Linnæa, xxi. (1848) 440.

WESTERN TIBET; Gilgit, alt. 9-10,000 ft., Gilcs. - DISTRIB. Westwd. to the Atlantic N. Asia.

Stem 2-3 ft., densely tufted. Leaves 12-18 in., rigid, convolute, sheaths smooth or rough; ligule oblong Panicle tew-fid, branches short. Spakelets about 1 in. long; gl. I and II hyaline, tips almost capillary; III hirsute, callus \( \frac{1}{5} \) in. long; awn twisted and glabious from the lower third.

- \*\*\* Awn glabrous or scaberulous, or hairy on the column only.
- + Tip of gl. III entire.
- 7. S. capillata, Linn. Sp. Pl. Ed. II. 116; panicle very narrow sheathed, spikelets 1 in., gl. II longer than I, III=about ½ II glabrous above, awn 6-8 in. flexuous smooth glabrous throughout. Host Gram. Austr. ii. 4, t. 5; Reichb. Ic. Fl. Germ. t. 46, Kunth Enum. Pl. i. 180, Suppl. 133; Trin. & Rupr. in Act. Petrop Ser. VI. v. (1842) 72, t. 55; Ledeb. Fl. Ross. iv. 449; Steud. Syn Gram. 130, Boiss Fl. Orient. v. 500. S. capillaris, Gronov. ex Trautv in Act. Hort. Petrop. ix. (1848) 350. S. erecta, Hort. Madr. ex Trin. Diss. i. 186, in Mem. Acad. Petersb. vi. I. (1829) 81. S. juncea, Lamk. Illust. i. 157. S. Lagascae, Guss. Pl. Rar. 48, Fl. Sic.

Prodr. i. 132 (ex Bertol.). S. sareptana, Beck. in Bull. Soc. Nat. Mosc. lvn. (1882) 52. S. ukranica, Steud. Nom. Ed. I. 816. S. ukranensis, Lamk. l. c. S. Varonini, Krassn. in Script. Bot. Hort. Univ. Petrop. ii. 22.

WESTERN HIMALAYA; Kashmir, alt. 9-11,000 ft., Jacquemont, &c. - DISTRIB.

Westwd. to Spain. Dahuria. China.

Stem 2-3 ft., rather stout. Leaves 1-2 ft, filiform, convolute, scaberulous; ligule lanceolate. Panicle very narrow, more or less enclosed in a sheath, which is 6-10 in. long with a filiform blade often as long as itself; branches and pedicels Spikelets white, glistening, hyaline, gl. I and II very narrow, with finely acuminate tips; I 5-nerved below; II 5-nerved; III 1 in. long, nerves pubescent below, above and palea quite glabrous; callus nearly half as long as its gl., scabrid, top bearded. Anther cells with naked tips. - Dr. Stapf informs me that the N. America S. comata, Trin. & Rupr. might be referred here.

8. S. sibirica, Lamk. Illustr. i. 158; tall, leaves long flat, panicle elongate very narrow branches erect, spikelets 3-1 in. green lanceolate, gls. I and II oblong-lanceolate, III harry, awn about twice as long as the spikelet rather stout harry towards the base only. Kunth Enum. Pl. i. 185, Trin in Act. Petrop. (1829) 78; Trin. & Rupr. l. c. 1842, 59; Ledeb. Fl Ross. iv. 448, Ic Fl. Ross. t. 99, Steud. Syn Gram. 129; Borss. Fl. Orient v 499; Duthie Fodd. Grass. N. Ind. 27. Avena sibirica, Linn. Sp. Pl. 79; Gmel. Fl. Sibir. i. t. 12.

WESTERN TEMPERATE HIMALAYA, from Kashmir to Kunawur, alt. 8-9000 ft., Falconer, &c., Black Mts., Duthie. - DISTRIB. Affghan Sibern to Korea.

Stem 2-3 it., as thick as a duck's quill or more, simple or branched. Leaves 1-2 ft. by  $\frac{1}{8}-\frac{1}{3}$  in., smooth; ligule oblong. Panicle 6-12 in., inclined; branches erect and appressed, rarely spreading, scaberulous; pedicels usually shorter than the terete spikelet. Gls. I and II subhyahne, III nearly as long as II, terete or slightly dorsally flattened; palea as long as its gl., linear, obtuse, dorsally hairy; callus short, conical. Anther-tips bearded.

Var.? pallida; very slender, leaves filiform, spikelets 1-1 in. pale, gl. III half as long as II, awn capillary three to four times as long as the spikelet. S. pallida, Munro en Duthie Grass. N.W. Ind. 27 (name). S. sibirica, Linn. var. Herb. Strachey & Winterbottom .- Tibet, N. of Kumaon, alt. 15,000 ft., Strach. &

Winterb .- The specimens are very scanty and want radical leaves.

9. S. tortilis, Desf. Fl. Atlant. i. 99, t. 31; annual, panicle partially sheathed dense-fid. almost spiciform, spikelets fascicled, gl. I and II subequal much longer than IV setaceously linear, III linear hairy or scabrid, awn 2-4 in. straight column only hairy, callus long acute. in Act. Petrop. (1829) 78, 185, Trin. & Rupr. L.c. VI. v. (1842) 64; Kunth Enum. Pl. 1. 180; Steud. Syn. Gram. 130; Boiss. Fl. Orient. v. 500. S. capensis, Nees Fl. Afr. Austr. i. 170. PThunb. Prodr. Pl. Afr. Austr. 109. S. humilis, Brot. Fl. Lusit. i. 86 (non Cav.). S. paleacea, Sibth. & Sm. Prodr. Fl. Græc. i. 65; Fl. Græc. i. t. 86 (non Vahl). S. seminuda, Vahl ex Hornem, Hort. Hafn. 1. 76.

The Panjab; Peshawur and Wazuristan, Stewart.-DISTRIB. Westwd. to the

Atlantic. S. Africa.

Stem very slender, tufted, 4-6 in. Leares filiform. Panicle 1-4 in., sheath sometimes 1/4 in. broad or more. Spikelets 3/1 in.; gl. I and II 3-nerved; callus of III = 1 of the gl. bearded at the top only; column of awn hairy throughout its length. Anthors with bearded tips.

++ Tip of gl. III 2-fid or 2-toothed.

10. **S. Jacquemontii**, Jaub. & Spach, Ill. Pl. Or. iv. 60, t. 639; leaves convolute filiform, panicle nariow rachis and lax-fid. branches filiform, spikelets  $\frac{1}{3} + \frac{1}{2}$  in. linear-lanceolate, gl. I and II subequal lanceolate acuminate, III half as long as II terete villous, awn capillary geniculate 3-4 times as long as the spikelet villous at the base. Lasiagrostis Jacquemontii, Munro ex Boiss. Fl. Orient. v. 506.

N. W. HIMALAYA; Kashmir, Astor, Tilail, &c., alt. 8-9000 ft., Jacquemont,

&c. WESTERN TIBET; Piti, Thomson - DISTRIB. Affghanistan.

Stems densely tufted, erect, 10-18 in., very slender. Leaves 6-10 in., erect, subflexuous; ligule a very short membrane. Pancele 4-6 in. long, erect or slightly inclined, branches erect few-fid. Spikelets erect, green or purphish, pedicels rather shorter than the spikelets; gl. I and II 3-nerved; III \( \frac{1}{3} \) in., terete, villous all over; try 2-toothed; awn I-1\( \frac{1}{4} \) in. twisted below the knee; callus very short, conical, villously bearded; palea much shorter than the gl. Anther-typs bearded.

11. **S. Duthiei,** Hook. f: tall, very slender, leaves very long and narrow, panicle long narrow few-fld., rachis and long pedicels capillary, spikelets  $\frac{1}{3} - \frac{1}{2}$  in., very narrow, gl. I and II sphequal very narrowly lanceolate, III sparsely hairy, awn capillary nearly straight about twice as long as the spikelet.

WESTERN HIMALAYA; Garwhal, alt. 12-13,000 ft., Duthie (n. 273).

Stem 3-5 ft., tutted. Leaves 12-18 in. or more, \(\frac{1}{2}\) in. broad, flat, or the lower convolute; ligule large, oblong, obtuse. Panacle 8-10 in., branches bearing one or two erect spikelets at the extremity, lower branches 3 in. Spikelets pale, glistening; gl. I 3-nerved, II 5-nerved; III about \(\frac{1}{3}\) shorter than II, tip minutely 2-fid; awn \(\frac{2}{3}\) in. hairy at the twisted base; callus short, conical, oblique, bearded; palea nearly as long as the gl., glabrous. Anther-tips bearded.

12. **S. Hookeri**, Starf in Journ. Linn. Soc. xxx. (1894) 121; tall, robust, leaves convolute, panicle oblong loosely branched, branches manyfid., spikelets  $\frac{1}{2}-\frac{1}{2}$  in. longer than their pedicels, gl. 1 and II subequal oblong-lanceolate acute minutely scaberulous, IV sparsely hairy or villous, awn about as long as the gl. scaberulous. S robusta, Duthie Grass N.W. Ind. 27 (name). Lasiagrostis robusta, Munro mss. ex Duthie l.c. (name).

WESTERN TIBET; in wet places, alt 10-14,000 ft., Jacquemont; Nubra, Thomson. Tibetan Sikkim, alt. 15-16,000 ft., J. D. H.—Distrib. Central Tibet, alt. 14,800

ft., Thorold.

Stems 3-4 ft., densely tufted, as thick as a swan's quill at the base, hard, leaty upwards. Leaves 1-2 ft., smooth or scaberulous; ligule \(\frac{1}{3}\) in, oblong. Panicle 3-10 in., inclined; branches 2-4-nate, suberect, and raches and pedicels smooth. Spikelets yellowish or purplish; gl. I broadest, 1-3-nerved; II 3-nerved; III rather shorter than II, terete, 5-nerved; awn more or less curved, slender, hardly twisted towards the base; palea nearly as long as the gl., hairy; callus small, conical, bearded Anther-tips naked or minutely bearded.—In the specimen from Northern Sikkim the stem at the base is as thick as the thumb, the leaves and stems shorter, and panicle sometimes contracted oblong and dense-fid., the short branches crowded, and the spikelets very shortly pedicelled; their gl. III is deeply 2-fid, with equal or unequal setaceous-pointed lobes.

- B. Column of awn not twisted. (See also S. Hookeri.)
- 13. S. splendens, Trin. in Spreng. Neue Entdeck. ii. 54; Diss. i. 183, in Act. Petrop. (1830) i. 76; tall, robust, leaves convolute, panicle

very large effuse or contracted, spikelets  $\frac{1}{8}$  in. sessile or shortly pedicelled, gls. I and II oblong-lanceolate unequal, 11I tip 2-fid, awn  $\frac{1}{4} - \frac{1}{8}$  in. Duthie Grass. N.W. Ind. 27; Steud. Syn. Gram. 132. S. altaıca, Trin. ex Ledeb. Fl. Alt. i. 80, in Act. Acad. Petrop. 1829, 74, Ledeb. Ic Fl. Ross. t. 222; Kunth Enum Pl. 1. 184. Lasiagrostis splendens, Kunth Revis. Gram. 1. 58, Enum. Pl. i. 178; Trin. Sp. Gram. Ic. 89; Griseb. in Goett. Nachr. 82. Agrostis longiaristata, Herb. Ross. ex Kunth Enum. l. c.

WESTERN TIBET, alt. 8-12,000 ft., Falconer, &c .- DISTRIB Siberia.

Stem 3-5 ft., as thick as a goose-quill below, yellow, shining; roots very stout, vermiform. Leaves 6-12 in., and sheaths smooth or scaberulous, acuminate, lower sheaths long loose, ligule elongate. Panicle 12-18 in., pyramidal when open; rachis slender, smooth; branches semi-verticillate, capillary, 4-10 in., simple below, branched above. Spikelets white or dull purplish; gl. I and II subacute; I 1-nerved; II longest, 3-nerved, III and palea villous; callus short, conical; awn \(\frac{1}{2}\)-\frac{1}{3}\) in., not twisted. Anther-tips bearded. Lodicules 3, oblong, very minute.—A small state collected in Balti by Schlagintweit and in the Karakoram, alt. 9000 ft by Clarke, is only 18 in. high, with an open panicle 3-6 in. long, and pale purple spikelets.

14. S. Orthoraphium, Steud. Syn. Gram. 131; stem slender, leaves flat or convolute, panicle very nairow, branches few erect few-fld., spikelets  $\frac{1}{8} - \frac{1}{4}$  in., gl. III as long as II sparsely hairy tip entile, awn glabrous with 2 or more deflexed spinules towards the base. Orthoraphium Roylei, Nees in Proc. Linn. Soc. i. (1841) 94, in Ann. & Mag. Nat. Hist. (1841) 221.
—Streptachne? Wall. Cat. n. 3795.

TEMPERATE HIMALAYA; from Kashmir to Sikkim, alt. 7-11,000 ft, Wallich, &c. NAGA HILLS, alt. 10,000 ft., Clarke.

Stems densely tufted, 18-24 in. Leaves 6-12 in.,  $\frac{1}{10-\frac{1}{6}}$  in. broad, and sheaths quite smooth; ligule short, ciliate. Panicle 6-10 in, rachis erect; branches solitary or binate, lower 1-3 in. bearing few distint, nairow, terete, pedicelled spikelets; gls. subequal, 1- or faintly 3 nerved, obtuse or tips sub-dentate; III very nairow, subrostrate; callus short, obconic, bearded; awn 1 in., rather stout, not twisted, nearly smooth, jointed on the gl. but persistent. Lodicules 3, large, oblong, obtuse.

#### DOUBTFUL SPECIES.

S. BREVIFLORA, Griseb. in Goett. Nachr (1868) 82; stems 1-1½ ft., leaves short convolute, ligule short obtuse, panucle narrow base sheathed, branches 1-2-nate distant, gls. I and II linear-lanceolate acuminate, III seriately hairy, awn 2 in, hairs towards its base shorter.—Western Tibet, Gnari Khorsum, Schlagintweit. Probably S. orientalis, Trin.

## 61. ORYZOPSIS, Michx.

Perennial grasses. Leaves flat or convolute. Spikelets loosely panicled, ovoid or lanceolate, dorsally compressed, 1-fld. Glumes 3, I and II equal or subequal, acute or subrostrately acuminate, very thin; I 5-nerved; II sub 3-nerved, III shorter, coriaceous, articulate by a short broad glabrous basal callus, lanceolate or oblong-lanceolate, more or less pubescent, tip minutely 2-toothed, with a very slender often caducous untwisted awn; palea oblong, coriaceous, as long as the gl., glabrous or hairy. Lodicules 2, ovate, thin. Stamens 3, anther-tips minutely beauded. Grain dorsally compressed, oblong, free within the hardened gl. and palea.—Species about 16, N. temp. regions.

The species are very variable, and great as is dissimilarity between the average states of the following, apparent intermediates between them occur.

1. **O. lateralis,** Stapf, very slender, leaves short fillform convolute, panicle very narrow strict, branches short erect few-fid., spikelets  $\frac{1}{6} - \frac{1}{5}$  in. ovoid subrostrately acuminate, gl. I longer than II, awn of III  $\frac{1}{10} - \frac{1}{5}$  in. very caducous Piptatherum laterale, Munro ex Regel in Act Hort. Petrop. vii. (1880) 645; Artchis. in Journ Linn. Soc xviii. (1881) 21, 106. P. molinioides, Boiss. Fl. Orient. v. 509 (The Afghan pl.). P soongaricum, Munro in Herb. Kew. P. strictum, Munro in Cat. Pl. Griff. Falcon., &c. 56 (ined.). Milium laterale, Regel. l. c

WESTERN HIMALAYA; from Kashmir to Kunawur and Western Tibet, alt. 12-14,000 ft — DISTRIB. Affghanist. ?

Stems densely tufted, forming a stout branching base, very slender, smooth. Leaves 2-4 in., smooth or nearly so, acuminate, struct or flexuous; ligule oblong, hyaline. Panicle 4-10 in., thin, rachis smooth, branches and pedicels scaberulous, bynkelets ovoid or ovate-lanceolate, green or tipped with red-purple; gls. I and II subrostrately acuminate, faintly 5-nerved, pair next the midrib arching and anastomosing with the median, outer pair similarly arching the last lower down; II more obscurely 3-5-nerved; III about \(\frac{1}{2}\) shorter than II, lanceolate, finely subsilkily pubescent, tip minutely 2-toothed; awn usually very short, very slender, not twisted. Lodicules 2, ovate, hyaline. Anther-cells minutely bearded. Grain oblong.

Lodicules 2, ovate, hyaline. Anther-cells minutely bearded. Grain oblong.

Var. effusa, lower branches of panicle larger 1-1 in. long. O. effusa, Hack. ex

Herb Duthie.—Hazara and Baltistan, alt. 9-10,000 ft., Duthie. Karakoram, alt.

10,000 ft., Clarke.

2. **O. Munroi,** Stapf; tall, stem stout or slender, leaves narrow flat, panicle effuse lower branches long many-fld. towards the ends, spikelets  $\frac{1}{2}$  in. ovoid rostrately acuminate, gls. I and II equal, awn of III  $\frac{1}{7}$ — $\frac{1}{2}$  in O. divulsa, Herb Clarke. O. kashmirensis, Hack. ms. ex Herb Duthie. Piptatherum scongaricum, Duthie in Atkins. Gaz. N.W. Ind. 626 (name). P. holciforme, Herb. Ind. Or. Hf. & T.

WESTERN HIMALAYA; from Kashmir to Garwhal, alt. 7-11,000 ft. WESTERN

TIBET; Ladak, Nubra and Zanskar, alt. 10-13,000 ft.-Distrib. Affghan.

Stem 2-4 ft, about as thick as a crow-quill. Leares 4-10 by 10-4 in., finely acuminate, hardly scaberulous, margins nearly smooth; ligule oblong, hyaline. Paniele 6-12 in, branches in distant pairs, filiform, nearly smooth; lower naked for 1-3 in., then branching shortly and bearing shortly pedicelled spikelets. Spikelets variable, from ovate to lanceolate; gls. I and II green or tipped with purple or wholly purple; III and its palea pubescent. Lodicules, stamens and grain as in lateralis, but larger.—The larger broader glumes longer awn and great size of the plant distinguish this from var. effusa of lateralis.

3. **O.** æquiglumis, Duthie Grass. N.W. Ind. 27; tall, rather stout, leaves long flat, pauicle long effuse or contracted, lower branches long many-fld. towards the ends, spikelets  $\frac{1}{4-\frac{1}{3}}$  in. ovoid acuminate, gl. I and II equal, awn  $\frac{1}{7-\frac{1}{3}}$  in. ?O. cœrulescens, Duthie Grass. N.W. Ind. 28 (name). O. Duthiei, Hack. ex Herb. Duthie. Piptatherum æquiglume, Munro ex Duthie in Atkins. Gaz. N.W. Ind. 626 (name) — Pipt. n.sp. Herb. Strach. & Wint. n. 2.

TEMPERATE HIMALAYA; from Kashmir to Sikkim, alt. 6-10,000 ft.

Very closely allied to O. Munroi, but usually a stouter plant, and taller, spikelets larger often of a dark or dull green mived with purple, gls. I and II not so beaked, leaves longer, awn and anthers longer. It may be a state of that plant from moister or warmer localities. I have seen no specimen of O. cœrulescess, Duthie, which was collected at Gungotri, alt. 9-10,000 ft.

### 62. MILIUM, Linn

Annual or perennial grasses. Leaves flat. Spikelets loosely panieled, not jointed on their pedicels, ovate, dorsally compressed, 1-fld., rachilla not produced. Glumes 3, I and II subequal, thin, 3-nerved, persistent; III oblong or obovoid, dorsally compressed, coriaceous, shining, not awned; callus very short, broad, naked; palea 2-nerved. Lodicules 2. Stamens 3. Styles short, free. Grain ovoid or oblong, free within the gl. and palea.—Species 5 or 6, N. temp. regions.

M. effusum, Linn. Sp. Pl. 61; perencial, panicle effuse, spikelets glabrous. Fl. Dan. t. 1143; Host Gram. Austr. iii. t. 22; Engl. Bot. t. 1106; Knapp Gram. Britt. t. 19; Kunth Enum. Pl. 1. 66, Suppl. 44, t. 10, f. 1; Reichb Ic. Fl. Germ. t. 45, vii. t. 73; T. Nees Gen. Fl. Germ. Monoc. 1. n. 17; Steud Syn. Gram. 34; Ledeb Fl. Ross. IV. 510; Aitch. Cat. Panjab Pl. 158; Duthie Grass. N.W. Ind. 28. M. ascendens, Roxb. Hort Beng. 8 (name). M. dubium, Jacquem mss. Agrostis effusa, Lamk. Encycl. i. 159.

WESTERN HIMALAYA, alt. 7-11,000 ft., from Kashmir, Jacquemont, &c., to

Kumaon, Strackey & Winterb - DISTRIB. N. Temp. and Aictic regions.

Perennal. Stem 2-4 ft., erect, smooth, shining, leafy. Leaves 6-12 by 1-1 in. acute, minutely, scaberulous or smooth above; ligule oblong, truncate, torn. Panicle 5-10 in., close or effuse; branches capillary, fascicled or subverticillate, naked below, at length spreading or deflexed. Spikelets 1 in., green.

#### DOUBTFUL INDIAN SPECIES.

M. PHLEOIDES, Sweet, Hort. Brit. Ed. 2, 555.

# 63. HELEOCHLOA, Host.

Rigid annual or perennial erect or prostrate grasses. Leaves flat or convolute. Spikelets 1-fld., densely imbricate in cylindric spikes or spicitorm panieles, laterally compressed; iachilla not produced above gl. III. Glumes 3, hyaline, I and II subequal or I shorter, keeled, 1-nerved, persistent, III = II or longer, lanceolate or oblong, 1-nerved; palea oblong, obtuse or 2-fid, 2-nerved. Lodicules 2 (or 0?) Stamens 2 or 3. Styles elongate. Grain ovoid, loose in the gl. and palea.—Species few, Oriental.

Crypsis aculeata, Ait., a grass resembling Hel. schoenoides in habit, but with capitate spikelets, is recorded as Indian by Aitchison (Cat. Panjab. Pl. 157), Boissier (Fl. Orient. v. 475) and other works, but no doubt by mistake for Heleochloa schoenoides. I have seen no specimen of Crypsis, which is an Eastern and Siberian plant from India, or even from Affghanistan.

1. **H. schoenoides,** Host Gram. Austr. i. 23, t. 30; annual, stems compressed prostrate spreading in a circle from the root, panicle ovoid-oblong sessile on the greatly dilated sheath of the uppermost leaf. Boiss. Fl. Orient. v. 476; Duthie Fodd. Grass. N. Ind. 48. Crypsis aculeata, Duthie Grass. N.W. Ind. 25, Fodd Grass. N. Ind. 45, t. 62. C. schoenoides, Lamk. Illust. i. 166, t. 42, t. 1; Kunth Enum. Pl. 1. 22, Suppl. 17, t. 5, f. 1; Ledeb. Fl. Ross. iv. 459; Steud. Syn Gram. 1:2; Duthie Grass. N.W. Ind. 25. C. compacta, Steud. l. c. 151. C. nilaica, Fresen. & Notar. in Mem. Acad. Tor. Ser. II. xiv (1854) 322. C. vaginiflora, Opiz Natural. viii. (1824) 83, Steud. l. c. 152. Phalaris vaginiflora, Forsk. Fl. Ægypt. Arab.

18. Phleum scheenoides, Linn. Sp. Pl. 60; Jacq. Fl. Austr v. App. 29 t. 7 Ic. 1. 2 t. 15; Cav. Ic. 1. t. 52, f. 5. Spartina phleoides, Roth. Neue Beytrag. i. 101. Pechea sub-cylindrica, Pourr. Chlor. Narbon n. 103.

The Panjab, Western Himalaya, and Western Tibet; Kashmir, Jacquemont. Iskardo, alt. 7000 ft., Thomson. Bandulkund, Duthie. ? Sikkim; at Dorjiling,

Herb Griffith .- DISTRIB. Westward to the Atlantic.

Glaucous. Stems many, 1-10 m, prostrate with ascending tips, leafy, rigid. Leaves 1-2 in., narrowly lanceolate, acuminate; sheaths deeply furrowed, margins glabrous or ciliate; ligule a short ring of hairs. Pauscle \(\frac{1}{2}\)-2 in. by \(\frac{1}{2}\)-\(\frac{1}{2}\) in. dam, green. Spikelets \(\frac{1}{3}\) in., gl. all 1-nerved, keels ciliate; I and II narrowly lanceolate, acuminate, I shortest; III ovatc-lanceolate, acuminate, palea oblong, truncate, nerveless. Lodicules 2, oblique, cuneate Stamens 2-3, filament very long; anthers small—The Bandulkund specimens are very small and pale, almost silvery white, with very small spikes hardly emerging from the leaf-sheath. The Sikkim habitat is probably due to a misplaced ticket.

2. **H. dura**, Boiss. Fl. Orient. v. 477; perennial, minutely pubescent, stem stout ascending, leaves involute pungent, panicle elongate cylindia narrow. H. alopecuroides, Duthie Fodd. Grass. N. Ind. 48 (non Boiss.). Crypsis dura, Boiss. Diagn. Ser. II. iv. 125. C. phalaroides, Duthie Grass. N. W. Ind. 25 (non M. Bieb.). Vilta setulosa, Trin. in Mem. Acad. Petersb. Ser. VI. v. n. (1840) 55; Steud. Syn. Gram. 154.

SCIND, Stocks, in salt water .- DISTRIB. Arabia.

Whole plant pale, and clothed with a very fine velvety pubescence. Stems 6-10 in., densely fastigiate from a woody inclined base which is clothed with leaf-sheaths, ascending, stout, as thick as a crow-quill, hard, few-leaved. Leaves 3-6 in, quite terete, rigid, pungent; sheaths short, coriaceous; ligule 0. Spikes 2-4 in by \( \frac{1}{2} - \frac{1}{4} \) in. diam. Spikelets \( \frac{1}{3} \) in., membranous, gl. all 1-nerved and with clinate keels, I and II narrowly oblanceolate, acuminate; III halt as long again, oblong, mucronate; palea oblong, bifid, 2-nerved, lobes obtuse clinate. Lodicules 2, obliquely cuneate, acute. Stamens 2; filaments very long; anthers short. Ovary ovoid; styles very long, slender.—Boissier cites Griffith by error, for Stocks, under the habitat of Scind.

### 64. PHLEUM. Linn.

Annual or perennial grasses. Leaves flat. Spikelets 1-fld., with rarely a rudimentary 2, imbricated on cylindric or oblong spiciform panicles, strongly laterally compressed, not jointed on the very short pedicels; rachilla sometimes produced beyond gl. III. Glumes 3, I and II equal, keeled, awned or mucronate; III much smaller, hyaline, awned or not, 3-5-nerved, toothed, palea small. Lodicules 2. Stamens 3. Ovary glabrous; styles long Grain compressed, free within the gl. and palea.—Species about 10, temp. and Arctic.

Phleum pratense, Linn. (Timothy grass) is mentioned by Royle (Ill. Bot. Himal. 417, and Duthie Grass. N W. Ind 28) as a native of the N.W. Himalaya (Urukta & Chur), but this has never been confirmed.

1. P. alpinum, Linn. Sp. Pl. 59; perennial, upper sheaths inflated, panicle ovoid or oblong, gl. 1 and II truncate as long as their awns keels hispid, III 3-nerved. Fl. Dan. t. 213; Host Gram. Austr. 111. t. 10; Kunth Enum. Pl i 29; Trin. Sp. Gram. Ic. t. 21; Engl Bot. t. 519; Knapp Gram. Brit. t. 7; Reichb. Ic. Fl. Germ. t. 50; Ledeb. Fl. Ross. iv. 458; Stend. Syn. Gram 150; Boiss. Fl. Orient. v. 484; Wall. Cat. n. 3779; Dutkie Grass. N.W. Ind. 28. P. Hænkeanum, Presl Rel. Hænk. i. 245;

Steud. l. c. 150. P nigricans, Willd. ex Trin in Mem. Acad. Petersb. Ser. VI. v. II (1840) 123. P. ovatum, Jacquem. mss.

Temperate and Subalpine HIMALAYA, alt. 10-13,000 ft., from Kashmir eastwards,

in wet places—DISTRIB. Arctic and Alpine regions. Fuegia.

Stem solitary, 6-18 in, ascending from a creeping base, smooth, stiff. Leaves short, spieading; ligule short. Panicle \(\frac{1}{2}\)-1\(\frac{1}{2}\) in, gieen or purplish; gl. I and II \(\frac{1}{2}\) in with the awn.

2. P. arenarium, Linn. Sp. Pl. 60; annual, upper sheaths inflated, panicle cylindric or oblong narrowed at the base, gl. I and II lanceolate inely acuminate hardly awned keels ciliated above, III very small hairy. Fl Dan. t. 915; Kunth Enum Pl. i. 28; Reichb. Ic. Fl. Germ. t. 50; Ledeb. Fl Ross. iv. 456; Steud. Syn Gram. 151, Boiss. Fl. Orient. v. 481; Attchis Cat. Panjab Pl. 158; Duthre Grass. N.W. Ind. 28. P. ramosum, Gilib. Exercit. ii. 519. Phalaris arenaria, Willd. Sp. Pl. 1. 328; Engl. Bot. t. 222; Knapp Gram. Britt. t. 4. Crypsis arenaria, Desf. Fl. Atlant. i. 63. Chilochloa arenaria, Beauv. Agrost. 37. Achnodon arenarius, Link Enum. Hort. Berol 1. 65. Achnodonton arenarium, Trin. Diss. 1. 166.

The PANJAB and WESTERN HIMALAYA; in Kashmir and Kishtwar, ascending to

9000 ft., Jacquemont, &c .- DISTRIB. Westward to the Atlantic.

Stems 6-14 in., tufted, glabrous, leafy. Leaves flat, sheaths smooth; ligule elongate, oblong. Panicle 1-2½ by ½-¾ in., glaucous, sometimes lobed. Spikelets ½-¾ in., rachilla produced beyond gl. III; gls. I and II punctulate; III 3-nerved.— Var. Thomsonii, Griseb. in Goett. Nuchr. (1868) 83. I find no character whereby to distinguish this from the common form.

3. P. asperum, Jacq. Collectan. i. 110, Ic. Rar. t. 14; annual, panicle long slender cylindric, gl. I and II cuneately obovate truncate cuspidate, keels scabrid above, III oblong obtuse pubescent. Vill Fl. Delph. ii. 61, t. 2, f. 4; Kunth Enum. Pl 1. 28; Steud. Syn. Gram. 151; Boiss. Fl. Orient. v. 481, Aitchis. Cat. Panyab Pl. 158, Dutkie Grass. N.W. Ind. 28 P. viride, All. Fl. Pedem ii. 232. P. paniculatum, Huds. Fl. Angl. 23 (excl. Syn.); Engl. Bot. t. 1077; Knapp Gram. Britt. t. 8. P. ventricosum, Moench Meth. 177. P. viride, All. 1c. Phalaris aspera, Retz. Obs. iv. 14; Host Gram Austr. ii. t. 37. Phal. paniculata, Ait. Hort. Kew, i. 87. Chilochloa aspera, Beauv. Agrost. 37; Reichb. Ic. Fl. Germ. t. 51.

The Panjab Himalaya, Royle, &c. Kunawur (Herb. Munto). Kashmir, alt. 5-6000 ft., Jacquemont, &c. The Salt Range, Artchrson.—Distrib. Westward to the Atlantic.

Stem 6-18 in, tufted, stout, rigid. Leaves broad, margins scabrid. Panecle 1-4½ by  $\frac{1}{4-\frac{1}{3}}$  in. diam. Spikelets green,  $\frac{1}{1-\frac{1}{3}}$  in.; gl. I and II rigid, glabrons or scabrid, the sinus between them rounded, 3-nerved, dilated above with gibbons membranous margins, III membranous =  $\frac{2}{3}$  of I and II.—Scent of Anthoxanthum.

# 65. ALOPECURUS, Linn.

Annual or perennial grasses. Leaves flat. Spikelets 1-fld., strongly laterally compressed, imbricating in a cylindric or oblong spiciform panicle, jointed on the tumid tip of the very short pedicels, rachilla not produced beyond gl. III. Glumes 3, I and II subequal, strongly compressed, keeled, often connate by their margins below; III as long as I and II, hyaline, convolute, with usually a basal or median dorsal awn; palea 0 (in Indian sp.). Lodicules 0. Stamens 2 or 3. Ovary glabrous. Grain laterally compressed, free.—Species about 20, temp. and cold regions.

- \* Perennials. Panicle ovoid or oblong.
- 1. **A. himalaicus**, Hook. f, upper leaf-sheaths inflated, panicle oblong or subcapitate, spikelets  $\frac{1}{5-\frac{1}{4}}$  in., gis. I and II lanceolate subaristately acuminate hirsute with spreading hairs longer than the spikelet is broad, III much shorter than I and II, awn twice as long as the spikelet or more.

KASHMIR and DRAS, alt 10-14,500 ft., Falconer, &c.

Stem 6-18 in, subsolitary, erect from a creeping base, rather stout. Leaves 3-5 in., erect or spreading, upper shorter lanceolate acuminate; upper sheaths 3-5 in., ower appressed; ligule large, scarious, toothed. Panicle 1-1½ in., grey-green or purplish. Spikelets membranous, hairs flaccid; gls. I and II counate below, tips dark; III ½ shorter than I or II, obtuse, apiculate.—Most nearly allied to A phalaroides, Schur, of Hungary, which is hardly distinguishable from A. brachystachyus, Bieb., of Siberia; but the spikelets of A. himalarcus are much larger than in those species, from which its acuminate gls. I and II and short III at once distinguish it.

2. A. arundinaceus, Poir. Encycl. viii. 766; rootstock creeping, panicle cylndric, spikelets & in., gl. I and II connate below acute keel ciliate with long hairs, awn short. Boiss. Fl. Orient. v. 487; Steud. Syn. Gram. 150 A. altissimus, Schur in Estr. Bot. Zeitschr. ix. (1859) 13. A. elatior, Jacquem. mss. A. muticus, Kar. & Kir in Bull. Soc. Nat. Mosc. xv. (1842) 527; Steud. l. c. 148. A. nigrescens, Jacq. Eclog. Gram. it. t. 13. A. nigricans, Hornem. Hort. Hafn i. 68; Kunth Enum. Pl. i. 24. A. pratensis, Aitchis. Cat. Panjab Pl. 158; Duthie Grass. N.W. Ind. 26, Fodd. Grass. N. Ind. 46 (non Linn.). A. pratensis, var. ruthenicus, Trin. Sp Gram. Ic. t. 45. A repens, Bieb. Fl Taur Cauc. ii. 54. A. ruthenicus, Weinm. in Fl. Dan. t. 2881. A. sibirious, Hort. Vind ex Roem. & Sch. Syst. ii. 271. A. ventricosus, Pers. Syn. i. 80.

WESTERN HIMALAYA, alt. 8-12,000 ft., from Kashmir to Garwhal.-DISTRIB.

Westward to Enrope, N. Asia.

Stem 2-4 ft., erect, slender. Leaves 6-10 in., acuminate; upper sheaths slightly inflated, 4-6 in. long; ligule rounded. Paricle 1-3 in. by \(\frac{1}{2}\)-\frac{1}{3} in. diam., green, soft. Spikelets subsilky; gl. I and II lanceolate, acuminate, more or less connate at the base or to above it; III acute, tip scaberulous; awn subbasal.—I doubt this being more than a form of A. pratensis, L.

- \*\* Annuals or subperennials. Panicle cylindric.
- 3. A. aristulatus, Michx. Fl. Bor. Am. i. 43; stems slender geniculately ascending, leaves glaucous, panicle slender, spikelets \( \frac{1}{12} \) \( \frac{1}{10} \) in. oblong, gls. I and II hyaline obtuse softly ciliate, III truncate, awn median-dorsal short, anthers oblong bright yellow. A. fulvus, Sm. Engl. Bot. t. 1467; Fl. Dan. t. 1804; Kunth Enum. Pl. i. 24; Reichb. Ic. Fl. Germ. t. 49; Ledeb. Fl. Ross. iv. 464; Boiss. Fl. Orient. v. 487; Steud. Syn. Gram. 407. A. geniculatus, Poll. Hist. Pl. Pal. n. 66; Host Gram. Austr. ii. t. 32 (non Linn.). A. paludosus, Beauv. ex Mert. & Koch. Fl. Germ. i. 481. A. subaristatus, Pursh. Fl. Am. Sept. i. 66.

Western Himalaya; Kashmir, in marshes, alt. 6-14,000 ft., Clarke, Duthie.—

DISTRIB. Europe, N. Asia, N America.

Stem 6-18 in., creeping below, flaccid. Leaves 4-8 in., linear, flat; upper sheaths somewhat inflated; ligule elongate. Panicle 1-2 in. by \(\frac{1}{6}\)-\(\frac{1}{2}\) in. diam., green. Gls. I and II free or counate at the very base, elliptic, obtuse.—Regarded by various authors as a variety of A. geniculatus, L.

4 A. geniculatus, Linn. Sp. Pl. 60; stems erect or geniculate below, leaves not glaucous, spikelets  $\frac{1}{10} - \frac{1}{8}$  in oblong, gls. I and II connate at or above the base subacute or obtuse hyaline chate, III truncate, awn subbasal, anthers linear orange-yellow. Engl. Bot. t. 1250, Knapp Gram. Brit. t. 18; Kunth Enum Pl. i. 24, Suppl. 18, t. 7, f. 1; Trin. Sp. Gram. Ic. t. 42; Steud Syn. Gram. 147; Aitchis. Cat Panjab Pl. 157; Duthre Grass. N.W. Ind. 25, Fodd. Grass. N. Ind. 46; Benth. Fl. Hongk. 408, Fl. Austral vn. 555. A. australis, Nees in Hool. Journ. Bot. ii. (1843) 412; Steud. l. c. 148. P. A. diandrus, Griff. Notul. iii. 11, Ic. Pl. Asiat. t. 142, f. 2. A. paniceus, O. Muell. in Fl. Dan t. 861. A. ramosus, Poir. Encycl. viii. 776; Steud. l. c. 146.—Alopecurus, Wall. Cat. n. 3780 C.

Temperate and Subtropical HIMALAYA, alt. 3-7000 ft., from Kashmir to Bhotan.

P Assam, Griffith .- DISTRIB. Most temp. regions.

Stems 6-18 in, stout or slender Leaves \( \frac{1}{8} - \frac{1}{8} \) in. broad; upper sheaths more or less inflated; ligule oblong. Paniele 1-3 in. by \( \frac{1}{2} - \frac{1}{8} \) in. diam., greenish-yellow. Spikelets larger than in \( A.\) aristulatus, not so membranous; gl. III with the truncate tip sub-crose. Stamens 2 or 3—Of Griffith's \( A.\) dumdyng, there are under the same number (Kew distrib. 2693) slender narrow-leaved specimens from Rydang in Bhotan, quite like the western Indian plant, but also a much larger one from the sandy banks of the Burrampooter in Assam, with many stout stems from the root, much broader leaves, with more ventricose upper sheaths, and rather stouter panicles (it is n. 6463 Kew distrib). Griffith, in his Itinerary Notes (158, n. 801, and Notulæ l. c.), says the stems and young sheaths are glaucous, and he figures the anthers as oblong and yellow, which are characters of \( \alpha \) istulatus; but the habit and spikes are those of \( geniculatus \). It may prove to be a distinct species.

5. A. agrestis, Linn. Sp. Pl. Ed. II. 89; stem erect or geniculate below, spikelets  $\frac{1}{5}$  in. gl. I. and II. connate to or below the middle obtuse, keels narrowly winged, III narrowly oblong tip truncate, awn subbasal twice as long as the spikelet recurved. Fl. Dan. t. 697; Host Gram. Austr. iii. t. 12; Engl. Bot. t. 848, Knapp Gram. Brit. t. 16; Kunth Enum. Pl. i. 23; Trm. Sp. Gram. Ic. t. 37, Reuchb. Ic. Fl. Germ. t. 19; Ledeb. Fl. Ross. iv. 465; Steud. Syn. Gram. 149; Boiss. Fl. Orient. v. 485; Duthie Grass. N.W. Ind. 25, Fodd. Grass. N. Ind. 46; Benth. Fl. Hongk. 407, Fl. Austral. vii. 555. A. myosuroides, Huds. Fl. Angl. 23.

Temperate and Subtropical HIMALAYA; Kashmir, &c. The PANJAB. KHASIA HILLS, alt. 3000 ft., Clarke. MUNNEPORE, alt. 3000 ft., Watt.—DISTRIB. Europe. W. and N. Asia. Introd. elsewhere.

Stem 6-10 in., or more. Leaves scaberulous, upper sheaths slightly inflated; ligule oblong. Pancel 1-3 in. by  $\frac{1}{4} - \frac{1}{8}$  in. dram, pale green. Spakelets loosely imbricate, rather narrow, glabrous except the keels of gl. I and II; gl. III narrowly oblong, truncate, tip toothed; awn rather stout. Anthers long, narrow—Possibly not indigenous in India. Watt describes it as found in rice-fields in Munnepore.

6. A. nepalensis, Trin. ex Steud. Syn. Gram. 148; stem erect or geniculately ascending, spikelets  $\frac{1}{10}$  in. obovate, gl. I and II connate to the middle subacute keels narrowly winged scabrid, III narrowly oblong, tip truncate exserted, awn subbasal very short or 0.—A. navicularis, Ham. ex Wall. Cat. n. 3780 A.—Alopecurus, Wall. Cat. l. c. A. B.

UPPER GANGETIC PLAIN; Oude, Hamilton. The PANJAB; Lahore, Thomson; Garwhal, Jacquemont.

Perhaps only a form of A. agrestis, which it closely resembles, but the spikelets are much smaller and very closely imbricate, less contracted at the base, and the keel of the glume is not chate. Stamens 3, anthers long.

### 66. PHIPPSIA, Br.

Very small perennial grasses. Leaves narrow. Spikelets minute, laterally compressed, in sparingly branched subspiciform panicles, not jointed on their pedicels; rachilla not produced beyond gl. III. Glumes 3, membranous, all persistent, 1 and II very short, obtuse, nerveless; III terminating the stipitiform rachilla, oblong, obtuse or tip rounded, nerved of or 1-3; palea as long or longer than the gl, tip 2-fid, nerves very faint. Lodicules 2, hyaline. Stamens 1-3. Styles very short, free, plumose to the base. Grum oblong, loose.—Species 2, an Arctic and the following.

This genus should perhaps be placed near to Colpodium.

## P. himalaica, Hook. f.; palea much longer than its gl.

ALPINE WESTEEN HIMALAYA; Kumaon, Barji-Khang Pass, alt. 14,500 ft, Strackey & Winterbottom; Garwhal, on the Duder Glacier, alt. 13-14,000 ft., Duthie.

Densely tufted, 6–3 in. high, very slender. Leaves 2–4 by  $\frac{1}{16}$  in., linear, obtuse; ligule long. Famicle 1–1½ in., sometimes almost reduced to a spike; rachis slender, smooth; branches very few, short, erect and appressed to the rachis, bearing 2–3 spikelets. Spikelets  $\frac{1}{10}$  in. long, pale brown; gl. I shortest, ovate, obtuse; II almost orbicular, concave, = about ½ III, nerveless, tip rounded; III raised on a short cylindric naked rachilla, concave, obtuse, nerveless, sparsely hairy on the back towards the base; palea longer than the gl. and nearly as broad, concave, tip 2-fid, keels ciliate. Lodicules 2, ovate-lanceolate. Stimen 1, filament very long; anther nearly as large as gl III. Ovary narrow; stigmas broadly plumose.—Differs from the Arctic P. alquão, in the much narrower leaves, in the fewer very shortly pedicelled larger spikelets not crowded on lateral branches, in the narrower gl. III, long palea, very large auther, broadly plumose stigmas, and long ligule.

# 67. CYATHOPUS, Stapf.

A slender perennial grass. Leaves flat. Spikelets 1-fld., very small, subterete, singly pedicelled on the branches of a decompound narrow paniele, articulate on the cupular tip of the pedicel, rachilla not produced beyond the flg. gl. Glumes 3, I and II subequal, oblong, beaked, persistent, stro. gly 3-nerved; III rather shorter, membranous, obtuse, 5-nerved below the middle; palea lanceolate, acute, keels smooth Lodicules 2, ovatelanceolate. Stamens 3, anthers short. Styles distinct, stigmas short.

C. sikkimensis. Stapf in Hook. Ic. Pl t. 2395. Hymenachne, n. 3. Herb. Ind. Or. Hf. & T. Milium Treutleri, Kuntze Rev. Gen. Pl. 780 (in part).

SIKKIM HIMALAYA; Lachoong Valley, alt. 7-10,000 ft., J. D. H. Stem 2-3 ft. high, from a creeping stoloniferous base. Leaves 6-10 by \( \frac{1}{6} - \frac{1}{4} \) in., finely acuminate, many-nerved, scaberulous, margins thickened smooth; sheaths deeply striate; ligule elongate, scarious. Paniele 8-12 in., oblong, or pyramidal; rachis and branches flexuous, terete, scaberulous; branches fascicled or subverticillate, lower 2-4 in. long, naked below. Spilelets \( \frac{1}{12} - \frac{1}{10} \) in., scaberulous, shortly pedicelled, pale green; gls. I and II stoutly subaristately beaked, scaberulous; nerves scabrid; III oblong, nerves slender; callus obconical, palea linear-oblong, 2-nerved. Anthers and stigmas short.—Munro regarded this very distinct grass as forming a new genus near the Hymenachne section of Panicum. Dr. Stapf has, I think, rightly referred it to near Garnotia.

### 671. WOODROWIA, Stapf.

(Genus not in Clavis, p. 7.)

Annual. Leaves narrow, flat. Spikelets 2-5, 1-fld, subdigitately panicled at the top of a slender peduncle, articulate on a fragile rachis, laterally compressed, rachilla not produced beyond the fig. gl. Glumes 3, I and II strongly laterally compressed, empty, acute, dorsally rounded and there sometimes much thickened, 1-nerved, I \(\frac{1}{3}\) longer than II; III = II, hyaline, 1-nerved, 2-lobed with a slender interposed geniculate awn; pales obovate-oblong, hyaline. Lodicules 2, cuneate, lobulate. Stamens 2, anthers linear. Styles free and stigmas very slender. Grain slender, cylindric, free within the gls.

## W. diandra, Starf in Hook. Ic. Pl. t. 2447.

The DECCAN; Poonah District, Woodrow.

Stem 12-18 in, slender, branched, nodes hairy. Leaves 3-4 by  $\frac{1}{12}$ - $\frac{1}{6}$  in., acuminate, hirsute, margins scabrid; sheaths appressed, glabrous or hairy at the mouth; ligule short, ciliolate. Spukes 1-2 in., rachis slender, hairy. Spukelets rather distant,  $\frac{1}{4}$  in. long, green or blueish; gl. I dorsally hairy, margins ciliolate; keel of II densely chate; awn of III 1 in., column shorter than the upper part, spirally ciliate.—This interesting plant arrived at Kew after the printing of the key, p. 7.

### 68. GARNOTIA, Brongn.

Erect, perennial rarely annual grasses. Leaves flat or convolute. Spikelets very small, 1-fld., panicled, solitary or geminate, jointed on the pedicels, narrowly-lanceolate; rachilla not produced beyond the fl. gl. Glumes 3, I and II empty, subequal, 3-nerved, acuminate, equalling or longer than III, awned or not; III bisexual, 1-3-nerved, triandrous, very narrow, terete, tip acuminate or notched, awned, rarely awnless or 3-awned; awn straight or base twisted, rarely geniculate or recurved; sides of palea auricled at the base. Lodicules 2. Styles free Grain linear or oblong, free.—Species about 20, Asiatic and Polynesian.

In the disposition and description of the species I have been aided by Dr. Stapf, who has drawn up an account of the whole genus.

- A. Stems densely tufted, uppermost internode exceeding the rest of the stem. Leaves long, stiff, erect, not articulate on the sheath; basal sheaths equitant, flattened.
- \* Leaves narrow, complicate (triangular on section); margins of lower sheaths woolly, at length glabrate.
  - † Awn of gl. III reflexed from the twisted base.
- 1. **G. Thwaitesii**, Stanf. mss.; stem very tall stout, panicle 1-2 ft. much branched, branches long slender, spikelets  $\frac{1}{3} \frac{1}{5}$  in. base shortly hairy, gl. I and II acuminate or shortly awned. G. scoparia, Thwaites Enum. Pl. Zeyl. 363; Trim. Cat. Ceyl. Pl. 106. Berghausia scoparia, Munro ex Thw. l. c.

CEYLON; hotter parts of the island, Thwaites.

Stem 2-4 ft. and more, often as thick as a goose-quill below, compressed. Leaves 1-3 ft., about \(\frac{1}{6}\) in. broad, wiry; lower sheaths strongly compressed and keeled, margins above woolly; ligule very short, ciliate. Pancle very variable in length VOL. VII.

and breadth, copiously effuse. Gl. I and II entire or notched with a short awn inithe notch; III tip notched or entire, awn rarely twice as long as its gl—Steudel refers Koenig's Agrostis scoparia to Arundinella nervosa, Nees A specimen so named in Rottler's Herbanium is a grass 10 ft high with flat leaves \(\frac{2}{7}\) in. broad and panicle  $2\frac{1}{2}$  ft. long, the spikelets have all fallen away. It is probably Thysanolana.

- †† Awn not reflexed from the twisted base, bent above, 0 in G. tectorum.
- 2. **G.** Schmidii, *Hook.* f, stem 1-3 ft. simple or branched above, leaves very narrow flexuous, panicle 6-10 in. narrow, spikelets  $\frac{1}{5}$  in. pale or dark brown, base bearded, glumes I and II notched and awned, III nearly as long as I notched, awn twice as long as the glume.

NILGHIRI HILLS, Schmid; Gondaloor Ghat, alt. 4500 ft., Lawson.

Stems tufted, base with the distichous leaf-sheaths an inch broad. Leaves  $-\frac{1}{12}$  in. broad, shorter than the peduncle. Panacle erect, branches  $1-1\frac{1}{6}$  in., erect.—Schmid's specimens are small, 1 ft. high with a rather loose panicle and almost red-brown spikelets. Lawson's is a very much larger plant with longer leaves and denser panicle and paler spikelets.

3. **G. tenuiglumis,** Stapf mss.; stem tall stout, leaves very narrow, panicle 2 tt. very narrow, spikelets  $\frac{1}{5}$  in., base nearly glabrous, glumes thin, II 1-nerved, awn of III short capillary base twice or thrice twisted. Chrysopogon muricatus, Herb. Wight, n. 3247.

WESTERN PENINSULA, Wight.

Stem 3-4 ft., as stout as a goose-quill, solid, upper internode 10-16 in. Leaves 12-16 in., exceeding the stem, glabrous except towards the very base, sheaths subcompressed, margins above woolly; ligule a ridge of hairs. Panicle strict, rachis stout, terete; branches 2-3 in., filterm, in distant clusters, strict, erect. Spikelets pale yellow-brown, appressed to the branchlets; gl. I aristulate; II subhyaline; awn of III rather longer than the spikelets.

4. G. scoparia, Stapf. mss.; stem 3 ft., leaves very narrow plicate or keeled, panicle 16-20 in. long narrow branches very long, spikelets \( \frac{1}{2} \) in. buse shortly bearded, glumes firm, II 3-nerved, awn of 11I about as long as the spikelet, base twisted. Berghausia scoparia, Munro in Herb. Ind. Or. H.f. \( \frac{3}{2} \) T. B. elata, Arn. ex Miq. Analect. Bot. in. 20 Miquelia elata, Arn. ex Nees in Wight Cat. in. 2600, ex Miq lc. Agrostis scoparia, Koen. et Aristida arundinacea, ex Wall. Cat. n. 8912 A. A. laxa et Aristida montana, Herb. Rottl. ex Wall. 8912 B.—Gramin. Wall. Cat. n. 8912.

MYSORE; at Chitaldrug, Heyne; Mysore & Kurg, G. Thomson.

Stem nearly as thick as a goose-quill below. Leaves erect, very narrow, glabrous or margins towards the base hairy; sheath with woolly margins; ligule a ridge of hairs. Panicle very narrow, branches 6-8 in, filiform, erect. Spikelets pale yellow; gl. I and II subsimilar, I subaristately acuminate, III 2-dentate, awn geniculate.

5. **G. tectorum**, Hook. f.; stem very tall stout, leaves long  $\frac{1}{2}$  in. broad, panicle 1-2 ft. narrowly oblong branches lax-fid. at length spreading, spikelets  $\frac{1}{6}$  in. base obscurely pubescent, gl. all subequal acuminate or mucronate not awned. G. stricta, Thw. Enum. Pl Zeyl. 363 (excl. Syn); Trim. Cat. Ceyl. Pl. 106. Berghausia mutica, Munio in Proc. Amer. Acad. iv. (1864) 362.

CEYLON; in elevated parts of the Island, Gardner, &c.

Stem 3-4 ft., as thick as a goose-quill below, strict. Leaves 2 ft, linear, acute, base plicate, more or less hairy, sheath hirsute above or glabrous; ligule very short,

truncate, ciliate. Pancle 8-18 in.; rachis stout, strict; branches slender, rigid. Spikelets rather few and distant, geminate, lower subsessile, upper on capillary pedicels.

- B. Leaves scattered, linear or very narrowly lanceolate, flaccid, articulate on the sheath.
- 6. G. polypogonoides, Munro ex Oliver in Hook. Ic. Pl. t. 1481; stem 6-12 in. slender, leaves \( \frac{1}{10} \rightarrow \) in. broad lanceolate from a narrow base, panicle contracted flexuous, spikelets \( \frac{1}{6} \) in. base bearded, gl. I and II entire one or both long-awned, III 3-awned. G. polygonoides, Duthie Grass. N.W. Ind. 12. Berghausia Emodi, Endl. ex Mig. Analect Bot. II. 20. Miquelia Emodi, Arn. & Nees in Nov. Act. Nat. Cur. xix. Suppl. I. (1843) 179; Steud. Syn. Gram. 119.—Gen. Nov. Wall. Cat. n. 8884.

TEMPERATE HIMALAYA; from Garwhal to Sikkim, alt. 6-9000 ft.

- Stem tufted, rarely branched, about as thick as a crow-quill. Leaves 4-6 by  $\frac{1}{12} \frac{1}{4}$  in., hirsute towards the base; sheath with glabrous or pubescent margins; ligule very short, fimbriate. Panicle 2-5 in.; branches subscaberulous. Spikelets green or brown; gl. I narrowly lanceolate, 3-nerved; II broader; III dark brown, 2 lateral nerves excurrent as minute bristles, median awn many times longer than its gl., base twisted.
- 7. G. stricta, Brongn. in Duperr. Voy. Bot 132, t. 21; stems 2-3 ft. tufted, leaves  $\frac{1}{10} \frac{1}{2}$  in. broad, lower lanceolate from a narrow base, panicle 2-10 in. very narrow, branches in distant fascicles, spikelets  $\frac{1}{10} \frac{1}{2}$  in. base sparsely hairy, gl. I and II finely acuminate or II notched below the awn, III entire or notched awned or not, awn shorter or longer than its gl. G. ascendens & Griffithii, Munro in Cat. Pl. Griff Helf. &c ined. G. augustata, Hack mss. G. sandvicensis, Hillebr. Fl. Hawaii, 513. ? Berghausia pallens & B. tenella, Arn. ex Miquel Analect. II. Bot. 21, 22. B. ascendens, Munro mss. Andropogon adscendens, Heyne ex Wall. Cat. n. 8906. Chrysopogon?, Wall. Cat. n. 8789. Tripogon?, Wall. l. c. n. 8906. Aira, Griff. Notul. iii. 56, Ic. Pl. Asiat. t. 145.—Herb. Wight, n. 3243, 3244.

SUBTROPICAL and TEMPERATE HIMALAYA, from Garwhal to Mishmi and BUEMA, alt. 4-9000 it Khasia Hills, alt. 4-6000 ft. Behar; on Parusnath, Clarke. Chota Nagpore and Western Ghats, from the Concan southward, Wight, &c.

(Kew distrib. 6780, 6781, 6787).—DISTRIB. Sandwich Islds.

Annual? Stem usually geniculate and branched at the base, rarely thicker than a crow-quill, stiff, nodes glabrous or pubescent. Leaves 6-10 in., lanceolate or linear-lanceolate, flat or margins involute, glabrous or hirsute or scabrid above; sheath glabrous or hirsute above; ligule short, truncate. Panicle strict or flacoid, branches scaberulous. Spikelets pale; gl. I and II 3-nerved, median nerve sometimes excurrent, III 1-nerved or nerveless, median awn ½ in. or less.—Probably G. patula, Munro, of China and Tonkin, which has densely tufted leaves, is this species.

Var. khasiana, Stapf; stout, 3 ft. high, leaves sometimes nearly 1 in. broad,

panicle a foot long.

Var. brevuristata, Stapf; gl. I and II not awned.

8. **G.** arundinacea, *Hook. f.*; stem branched, leaves lanceolate from a rounded or subcordate base flat acuminate, panicle 4-6 in. nodding, branches fastigiate capillary, spikelets  $\frac{1}{12} - \frac{1}{8}$  in., gl. I and II notched and awned, awn of III twice as long as its gl. Andropogon arundinaceus *Heyne in Herb. Rottler*.

NILGHIRI HILLS, alt. 2-6000 ft., Heyne, &c.

Stem reedy, as thick as a pigeon's quill, branches ascending. Leaves 2-3 in. by

Fin. broad at the base; sheath villous at the top; ligule very short, pubescent. Panicle flexuous, branches and capillary pedicels scaberulous. Spikelets pale, base sparsely hairy; awas variable in length, median very slender, not twisted.

9. G. Fergussonii, Trim. in Journ. Bot. xxvii. (1889) 170; stem 1-3 ft. leaves linear densely bearded at the base, panicle 4-6 in oblong, branches at length spreading, spikelets often in dimorphic pairs, upper 1 in. base obscurely bearded, gl I and II entire awned or not, III entire or tip 2-fid, awn twisted at the base at length deflexed. G. patula, Thw. mss. (C.P. 3947); Trim Cat Ceyl. Pl. 106. Andropogon Beckettii, Thw. mss.

CEYLON; Matale district, Bechett; Knuckle's Mts., alt. 5-6000 ft., Fergusson. Stems smooth, branched. Leaves 4-8 by  $\frac{1}{5}-\frac{1}{4}$  in., and sheath glabrous or sparsely hairy; ligule short, truncate. Panicle pule green or purplish, branches smooth. Spikelets in pairs, the upper often reduced to a glume; gl. I and II oblonglanceolate, awn short or 0; III with a single awn about 1 in. long.

10. G. courtallensis, Thwaites Enum. Pl. Zeyl. 363; stem 8-18 in. slender, leaves linear not densely bearded at the very narrow base, panicle 1-3 in. lax, branches at length spreading, spikelets sometimes in dimorphic pairs ; in. base obscurely hairy, gl. I and II lanceolate awnless or mucronate, III entire or tip notched, awn geniculate twisted below the knee. Trim. Cat. Ceyl. Pl. 106. Miquelia courtallensis, Arn. ex Nees in Nov. Act. Nat. Cur. xix. Suppl. i. (1843) 179; Steud. Syn. Gram. 119. Berghausia courtallensis, Nees ex Miq. Analect. Bot. II. 20 .- Wight Herb. n. 2376.

NILGHIRI and TRAVANCORE HILLS, Wight, &c., alt. 6000 ft., Lawson.

CRYLON; Adam's Peak, alt. 4000 ft., Gardner, &c.

Stems simple or brunched. Leaves rarely 3 in. long, lanceolate, acuminate, spreading, membranous, more or less harry, as are the sheaths; ligule very short. Panicle pale; branches smooth or slightly scaberulous. Spikelets few, shortly pedicelled; gl. I and II broader than usual in the genus, I thin, 3-nerved .- Batratherum, Wall. Cat. n. 8827, Andropogon minutissimus, Herb. Heyne, referred here by Steudel, is a totally different plant (see p. 147).

11. G. micrantha, Thwaites Enum. Pl. Zeyl. 363; stem 1-3 ft. branched and often creeping below, leaves linear-lanceolate from a narrow base, panicle 2-10 in. contracted lax-fid., branches capillary, spikelets 12-16 in. subsolitary, gl. I and II acuminate, III shortly awned or mucronate. Trim. Cat. Ceyl. Pl. 106.

CEYLON; Central Province, alt. 2-4000 ft., Thwaites (C.P. 945).

Stems elongate, branched, tufted and ascending, or creeping below. Leaves 4-6 by 3-3 m, sparsely hairy beneath; sheath glabrous except at the tip; liquid very short, truncate. Panicle pale green, at first contracted; branches scaberulous, at length spreading. Spikelets obscurely hairy at the base; awn about 1 in., strict, not twisted.

Var. nana, Stapf; stem short very slender, panicle 11-2 in., gl. III not awned Berghausia mutica, var. nana, Munro mss. Ceylon (C.P. 944).

12. G. fuscata, Thwaites Enum. Pl. Zeyl. 363; stems short tufted and creeping, base leafy, leaves short linear, panicle narrow few-fid., spikelets 1 in. base shortly bearded, gl. I and II with setaceous tips, III with a long awn compressed and once twisted at the base. Trim. Cat. Ceyl. Pl. 106.

CEYLON; Saffragam district, alt. 4000 ft., Thwaites.

Stem 1-4 in, compressed and leafy at the base; branches ending in a slender peduncle a foot long or less with one or two subulate leaves. Leaves chiefly radical, 1 by \(\frac{1}{2}\) in, rather thick in texture, lanceolate, acute, flit, smooth, margins smooth thickened, cauline convolute; sheath very short, compressed, mouth bearded; ligule truncate. Gl. I and II strongly 3-nerved.—The specimens are insufficient for a satisfactory description. The species is quite unlike any other.

### 69. POLYPOGON, Desf.

Annual or perennial grasses. Leaves flat. Spikelets 1-fld., minute, jointed (but persistent) on their pedicels, laterally compressed, keeled, densely crowded on the short branches of a spicitorm or lobed panicle; rachilla not produced beyond gl. III. Glumes 3; I and II equal, concave, keeled, 2-fid notched or entire, with a slender awn below the tip or in the sinus; III much-smaller, hyaline, sessile, truncate, toothed, awned or not; palea small, 2-nerved. Lodicules 2, falcate. Staniens 1-3, anthers small. Ovary glabrous; styles free. Grain obovoid, free within the gl. and palea.—Species few, natives of all warm regions.

1. P. monspeliensis, Desf. Fl. Atlant. i. 66; annual, panicle spiciform oblong or cylindric, gl. I and II oblong scaberulous ciholate tip obtuse or notched, awn from the sinus or beneath it as long to many times as long as the gl., III 2-toothed shortly awned. Beauv Agrost. 17, t. vi. f. 8, Mutel Fl Fr. t. 76, 77; Kunth Enum Pl. 1. 232, Suppl. 181, t. xiii. f. 7, T. Nees Gen. Fl. Germ. Monocot. i. n. 32; Reichb Ic. Fl Germ. t 31; Ledeb. Fl. Ross. iv. 443; Steud. Syn. Gram. 184; Boiss. Fl. Orient. v. 520; Benth. Fl. Austral. v. 546, Doell in Mart. Fl. Bras. II. iii. 44, t. 126; Thw. Enum. Pl. Zeyl 370, 444; Trim. Cat. Ceyl Pl. 108; Aitchis. Cat. Panjab. Pl. 165, Duthie Grass. N.W. Ind. 30, Fodd. Grass. N. Ind. 50. P. cruentus, Duthie l.c. (error for crinitus). P. maritimus, Duthie l.c. (not Willd.). P. nepalensis, Necs ex Steud. Non. Ed. II. ii. 378, Syn. Gram. l.c.; Trin. in Mem. Acad. Petersb. Ser. VI. 1v. ii. (1845) 255; Duthre l. c. 30. P. fugax, Nees ex Steud. l. c.; Duthre Fodd. Grass. N. Ind. 51. P. paniceus, Lag. Gen. & Sp. Nov. 3. P. polysetus, Steud. in Flora, xu. (1829) 467. P. zeylanicus, Nees ex Steud. Syn Gram. 182. Agrostis alopecuroides, Lamk. Illustr. 812. A. crinita, Manch Meth. 178. A. panicea, Willd. Sp. Pl. i. 128; Engl. Bot. t. 1704; Moon, Cat. Pl. Ceyl. 8. A.? Rora, Herb. Ham. ex Wall. Cat. n. 3777 B. A. triaristata, Knapp Grom. Britt. t. 23 Cynosurus paniceus, Linn. Sp. Pl. 73. Phleum crinitum, Schreb. Gram. 1. 151, t 20, f. 3; Sm. Fl. Græc. 1. 46, t. 22; Roxb. Fl. Ind. 1. 313. P. monspelieuse, Kvel. Descr. Gram. 57. Alopecurus aristatus, Gouan Hort. Monsp. 37; Huds. Fl. Angl. 28. Al. monspeliensis, Linn Sp. Pl. 61. Al paniceus, Lann. l. c Ed ii. 90. Phalams cristata, Forsk. Fl. Æg. Arab. 17.—Agrostis, Wall. Cat. n. 3777.

Throughout Continental India (not seen from Burma and the E. Peninsula). Western Tibet, ascending to 9000 ft., and Cevlon.—Distrib. Trop. and Temp. regions.

Stems tufted, 6 in.-2 ft., stout or slender, leafy, base geniculate, filiform and erect in starved states from Tibet, with very small spikes and very short awas. Leaves 3-6 by  $\frac{1}{2}-\frac{1}{4}$  in., green, ligule oblong. Pancle  $\frac{1}{2}-6$  in. long,  $\frac{1}{4}-1$  in. broad, pale yellowish-green, siley, sometimes lobulate. Spikelets  $\frac{1}{20}-\frac{1}{12}$  in, very shortly pedicelled. Gl. I and II very variable in brendth, obovate-oblong, sides scaberulous, keels scabrid, margins ciliate, tip entire notched or very shortly 2-fid; awas from the length of the gl. to  $\frac{1}{2}$  in. long, excessively delicate; III very small, oblong,

glabrous, 2-fid, awned or not; palea oblong, tip notched. Anthers very minute, short. Overy evoid .- The started Tibetan specimens are the P. fugax, Nees, they pass insensibly into the larger form. I have not found P. maritimus from any part of India. It may be distinguished by the deeply cleft gl. I and 1I.

2. P. littoralis, Sm Compend. Fl. Brit. 13, Engl. Bot. t. 1251; annual or perennial, panicle lobed, gl. I and II subentire or notched, awn twice as long as the gl. or less, III awned or not. Kunth Enum. Pl. i. 233; Reichb. Ic. Fl. Germ. t. 31, vii. t. 75; Steud. Syn. Gram. 184; Benth. Fl. Hongk. 427; Boiss Fl Orient. v. 521; Duthie Grass. N. W. Ind. 30. P. elongatum, Lagasc. Gen. & Sp. Nov. 3 (non Kunth). P. Lagascæ, Roem. & Sch. Syst. ii. 226; Trin. Diss. 1, 170. P. demissus, Steud l. c. Agrostis littoralis, Knapp. Gram. Britt. t. 22. A. lutosa, Poir. Encycl. Suppl. i. 249; Roem. & Sch. l. c. 1. 358. Santia elongata, Parlat. in Webb. Phyt. Canar. Scct. 111. 393.

TEMPERATE HIMALAYA, alt. 4-10,000 ft., from Kashmir to Bhotan and Munnepore. Western Tiber; Iskardo, Thomson.—Distrib. Temp. and subtrop.

regions.

Except by the uniformly shorter awns of the spikelets and usually broader lobed panicle, I find it very difficult to distinguish the annual form of this species from the common one of P. monspeliensis. In India P. littoralis does not descend to the plains, nor does it in the hills assume the filiform starved state of P monspelsenses. In Europe it is always described as perennial, and as usually a littoral plant with a creeping root. The following forms occur in India.

P. lettoralis proper; perennial, stem decumbent creeping and rooting below.

Var. Higegawers, annual, stems tutted ascending. P. Higegawers, Steud Syn. Gram, 422; Griseb in Goett. Nachr. (1868) 82.

Var. muticus; perennial, stems creeping and rooting, gls. I and II apiculate, III awnless .- Kunawur, Thomson.

# 70. SPHEROCARYUM, Nees.

A dwarf annual. Stem creeping and ascending, leafy throughout. Leares ovate-cordate, acute, amplexicaul. Spikelets 1-fld., very minute, ovoid, pedicelled on the close-set capillary branches of a pyramidal panicle which is sessile in the axil of the uppermost leaf, jointed on the pedicels; rachilla jointed at the base, not produced beyond gl. III. Glumes 3, cymbiform, I and II glabrous, hyaline; I nerveless; II longest, 1-neived; III hirsute, 1-nerved; palea as long as the gl., oblong, obtuse, keels distant. Lodicules 2, very minute. Stamens 3, anthers linear. Ovary narrowly ellipsoid; styles short, free. Grain ovoid, free, pericarp adherent to the seed.

S. elegans, Nees ex Steud. Nom. Ed. II. ii. 620. Sphærocarpum elegans, Nees ex Steud. l c. 256. Grayia elegans, Nees in Wight Cat. n. 2033; Steud. Syn. Gram. 119. G. zeylanica, Arn. ex Steud. Non. Ed. II. 1. 705. Isachne pulchella, Roth. Nov. Sp. 58; Kunth Enum. Pl. i. 136; Thw. Enum. Pl. Zeyl. 362; Trim. Cat. Ceyl. Pl 104, Benth. Fl Hongk. 414. Panicum elegans, Wight & Arn. ex Steud. Nom. Ed. II. ii. 256. P. malaccense, Trin. Gram. Panic 204; Nees Agrost. Bras. 212; Kunth l.c. 113; Miq. Fl. Ind. Bat. ini. 457. P. pulchellum, Spreng. Syst. 1. 322. Agrostis malaccensis, Koen. ex Heyne in Herb. Rottl Andropogon Grayia, Steud. Nom l. c. 1. 91.—Panicum, Wall. Cat. n. 8736.

SILHET and the KHASIA HILLS, in marshes, Wallich, &c. MERGUI, Griffith.

SINGAPORE, Ridley. CEYLON, Macrae, &c .- DISTRIB. China.

Stem 6-12 in., as thick as a sparrow's quill, prostrate and rooting below, then erect, rarely branched, nodes bearded. Leaves all alike in size and form, \$\frac{1}{2}\$-\$\frac{1}{2}\$ in. long, acute or acuminate, chlate-serrulate, subcorraceous, ecostate, nerves very closeset; sheaths much shorter than the internodes, glabrous or hirsute; ligule of closeset white hairs. Panicle 1-1\$\frac{1}{2}\$ in, solitary and terminal, with very rarely 1-2 lower on the stem; peduncle very short, concealed in the leaf-sheath; rachis rather stout; branches very many, opposite and alternate, capillary, spreading. Spikelets \$\frac{1}{2}\$-\$\frac{1}{10}\$ in.—This is undoubtedly Roth's Isachine pulchella. The habit is that of Panicum ovalifolium, Poir, with the leaf-nervation of an Isachine It differs from Agrostis in habit, and in the spikelets jointed on the pedicels (as in Paniceæ); and from Sporobolus in habit, foliage, and the adnate percarp of the grain.

### 71. SPOROBOLUS, Br.

Perennial, rarely annual grasses. Leaves flat or convolute. Spike-lets small or minute, 1-raiely 2-fld., in effuse or close or spiciform panicles, jointed on their pedicels, awnless: rachilla very short, jointed at the base, not produced beyond the fig. gl. Glumes 3, nerveless or 1-3-nerved, membranous, I and II unequal, persistent or singly caducous; III longer or shorter than I or II, 1-nerved; palea often splitting between the 2 very close nerves. Lodicules very minute or 0. Stamens 2-3, anthers short. Styles short, free. Grain loose within the gl. and palea, pericarp or its epidermis loose, deciduous, rarely adherent.—Species about 80, chiefly tropical.

- \* Glumes I and II both much shorter than III.
- 1. S. diander, Beauv. Agrost. 25; panicle narrowly pyramidal, branches capillary in scattered fascicles, spikelets  $\frac{1}{20-18}$  in., gl. I and II hyaline truncate nerveless, grain oblong or obovoid-oblong. Jacq. Eclog. Gram. t. 28; Link Enum. Hort. Reg. Berol. i. 87; Kunth Enum. Fl. 1. 213; Wall. Cat. n. 3765; Griff. Notul. 111. 46, Ic. Pl. Assat. t. 139, f. 85, Dalz. & Gibs. Bomb. Fl. 296; Thw. Enum. Pl Zeyl. 370; Trim. Cat. Ceyl Pl. 108; Atchis. Cat. Panyab Pl. 165; Duthie Grass. N.W. Ind. 29, Fodd. Grass. N. Ind. 40, t. 63; Miquel Fl. Ind. Bat in. 375; Benth. Fl. Austral. vii. 622. Vilfa diandra, Wight Cat. n. 1744 (non Trin.). V. erosa, Trin. in Mem. Acad Petersb. Ser. vi. Sc. Nat. v. II. (1840) 86; Steud. l.c. 159. V. Retzin, Steud. Nom. Ed. II. ii. 768, Syn. Gram. 162. Agrostis contracta, Herb. Heyne ex Wall. Cat. n. 3766 A. A. diandra, Retz. Obs. v. 19, Roxb. Fl. Ind. 1. 317. Panicum secundum, Herb. Heyne ex Wall. l.c. —Sporobolus, Wall. Cat. 3766, 3768.—Sporobolus, Griff. l.c. 44, Ic. t. 149, f. 2.

Throughout India and Burma, ascending the Himalaya to 5500 ft. CEYLON .-

DISTRIB. Asia and Austral trop.

- Stems 1-3 ft., slender. Leaves densely tufted, 3-10 in., very narrow, flat or convolute, margins entire; ligule a few hairs. Pancle 4-10 in., rachis very slender, sometimes capillary, strict; branches 1-1 in., sometimes flowerless at the base. Spikelets sessile or very shortly pedicelled; gl. I and II not half as long as III, broadly truncate and usually erose; III obtuse or subacute, obscurely 1-nerved. Stamens 2-3. Grain subtruncate, pericarp rather adherent.
- 2. S. indicus, Br Prodr. 170; stem stout, panicle very narrow branches short appressed covered to the base with crowded spikelets 18-12

in. long, gl. I and II obtuse hyaline 1-nerved, III opaque, grain broadly obovoid. Link Hort. Req. Berol. i. 87; Kunth Enum. Pl. 1. 211; Thw. Enum. Pl. Zeyl. 370; Trim. Cat. Ceyl. Pl. 108; Duthie Fodd. Grass. N. Ind. 49; Benth. Fl. Hongk. 426, Fl. Austral. vii. 622, Griseb. Fl. Brit. W Ind. 533. S. angustus, Buckl. in Proc. Acad. Sc. Philad. (1862) 88. S. elongatus, Br. Prodr. 170, Hook. Handb. N. Zeal. Fl. 327; Mig. Fl. Ind. Bat. iii. 376; Duthie Grass. N.W. Ind. 29. S. Lamarckii, Desv. in Hum. Prodr. Fl. Ind. Occ. 4. S. minor, Kunth Enum. Pl. 1. 212. S. tenacissimus, Becuv. Agrost. 26; Kunth l. c. 212, Suppl. 167; T. Nees Gen. Fl. Germ. Monoc. 1. n. 28; Duthie Fodd. Grass. N. Ind. 49. Vilfa capensis & elongata, Beauv. Agrost. 16; Trin. Gram. Diss. i. 154; Steud Syn. Gram. 159. V. exilis, Trin. in Mem Acad. Petersb. Ser. vi. Sc. Nat. v. II. (1840) 89; Steud. l. c. 159. V. indica, Trin. ex Steud. Nom. Ed. II. ii. 767, Syn. Gram. 162; Baker Fl. Maurit 449. V. tenacissima, H. B. & K. Nov. Gen. & Sp. i. 138, Nees Agrost. Bras. 393; Trin. Sp. Gram. Ic. t. 60; Steud. l. c. 160. P. rupestris, Trin. Diss ii. 22; Steud. l. c. 161. Agrostis elongata, Lamk. Illustr. i. 142. A. fertilis, Steud. l. c. 170. A. indica, Linn. Sp. Fl. 63. A. tenacissima, Jacq. Collect i. 85, Ic. Rar. 3, t. 16 (excl. Syn). A. tenuissima, Spreng Syst. i. 258.—Sporobolus, Wall. Cat. n. 3766, B, 3767.

Throughout INDIA, ascending the Himalaya to 5000 ft., BURMA and CEYLON.—DISTRIB. All warm countries.

Stem 2-3 ft., sometimes as thick as a small goose-quill at the base. Leaves 8-24 in., convolute or flat, rarely \( \frac{1}{2} \) in. dam., margins smooth; ligule a few hairs. Panicle 6-18 in., often interrupted; rachis stout, erect, or curved; branches erect, \( \frac{1}{2} \) in. often whorled, densely clothed usually to or to near the base with green spikelets, which are erect and imbricate. Spikelets larger than in S. diander. Gl. I = about \( \frac{1}{2} \) III; II not twice as long; III acute. Pericarp adherent.—It is not always easy to distinguish this from S. diander, which is much the most common in India. In its normal state indicus is a far more robust plant, with a stout rachis and branches of the panicle, larger and more herbaceous more crowded spikelets, and a broader grain; but both vary greatly in the panicle.

3. S. minutiflorus, Link Enum. Hort. Berol. i. 88; tall, slender, leaves long, panicle very large effuse supra-decompound, branches capillary, spikelets  $\frac{1}{30}$  in., gl. I minute subquadrate, II =  $\frac{1}{3}$  III orbicular-ovate obtuse, grain broadly obovoid. Kunth Enum. Pl. i. 214. Vilfa capillaris, Wight & Arn. ex Wight Cat. n. 2036 (non Miq). V. minutiora, Trin. Diss. i 158, Steud. Syn. Gram. 158. V. mangalorica, Hochst. ex Miq. Analect. Bot. ii. 24; Steud. l. c. 159. V. tenuissima, Schult Mant. ii. 479. Panicum tenuiflorum, Hort. Monac. ex Link. l. c. P. tenuissimum, Mart. ex Schrank in Denkschr Bot. Ges. Regensb. ii. (1822) 26.

The DECCAN PENINSULA, Wight. CANABA, Hohenacker.

Stem 2-3 ft. Leaves narrow, flat, finely acuminate, margins quite smooth; ligule of minute hairs. Panicle 12-18 in., erect; rachis quite smooth, very slender; branches innumerable, 1-2in, spreading, and branchlets excessively slender, flowering at the tips. Spikelets ellipsoid, dark colrd.; gl. I truncate; II broadly ovate, obtuse, nerveless; III ovate-oblong, obtuse, nerveless; palca shorter, broad, truncate. Stamens 2.

4. S. Wallichii, Munro mss.; very tall, erect, leaves long, panicle tall oblong or subpyramidal decompound branches capillary, branchlets divaricate few-fld., spikelets  $\frac{1}{10}$  in., gl. I minute truncate, II =  $\frac{1}{2}$  III or

longer ovate acuminate, grain broadly obliquely obcordate. Sporobolus, Wall. Cat. n. 3769 A.

BEHAR; Rajmahal Hills, Wallich. PEGU, Kurz. CEYLON; between Trinco-

malee and Kantalla, Ferguson.

Perennal? Stem 3-4 ft., as thick as a crow-quill, strict, sparingly leafy. Leaves 1-2 ft. by  $\frac{1}{6}$ - $\frac{1}{4}$  in , quite smooth; upper sheaths very long; liquie 0. Paniele 12-18 in. by 4-5 broad, branches opposite and whorled, branchlets flowering towards the tips. Spikelets pale brown; gls. II and III faintly 1-nerved; palea oblong, truncate, as long as its gl. Stumens 3.—Habit of S. minutifiorus, but spikelets very different.

5. **S. ioclados**, Nees Fl. Afr. Austral. 161; leaves short, panicle oblong or subpyramidal effuse, branches capillary, spikelets  $\frac{1}{16}$   $\frac{1}{12}$  in. scattered, gl. I lanceolate =  $\frac{1}{3}$  III, II =  $\frac{2}{3}$  III oblong-lanceolate obtuse, grain linear-oblong truncate. Vilfa ioclados, Nees ex Trin. in Mem. Acad. Petersb. Ser. VI. Sc. Nat. v. II. (1840) 65.

SCIND, Stocks .- DISTRIB S. Africa.

Stems 10-18 in., densely tufted, rather stout. Leaves 2-3 in., narrow, densely tufted, sheath short; ligule obscure. Pancle 3-7 in., branches opposite and alternate, spreading. Spikelets oblong, pale.—A very elegant grass.

- \*\* Glume I as long as III or nearly so. Panicle contracted.
- 6. S. virginicus, Kunth Revis. Gram. i. 67, Enum. Pl. i. 210, Suppl. 167; stems erect from a decumbent woody creeping base, leaves strict distichous convolute pungent, panicle elongate narrow interrupted branches very short, sp'kelets  $\frac{1}{10}$ ,  $\frac{1}{12}$  in. subsessile crowded, gls. I and II oblong-lanceolate acute, I shorter than II, grain broadly obovoid. Trim. Cat. Ceyl. Pl. 108; Benth Fl. Austral. vii. 621; Griseb. Fl. Brit. W. Ind. 533. S. littoralis, Kunth l. l. c. c. 68, 213. Vilfa barbata, Beauv. Agrost. 16. V. littoralis, Beauv. l. c; Sleud. Syn. Gram. 162. V. murina, Sieb. ex Steud. l. c. 157. V. orientalis, Wight Cat. n. 1745 (in part). V. virginica, Beauv. l. c.; Trin. Diss. i. 155; Sp. Gram. Ic. t. 48; Steud. l. c. 157; Baker Fl Maurit. 449. Agrostis barbata, Pers. Syn. i. 75. A. littoralis, Lamk. Illustr. 161. A. pungens, Pursh Fl. Am. Sept. 64. A. virginica, Linn. Sp. Pl. 63; Labill. Pl. Nov. Holl. i. 20, t. 23. Podosemum virginicum, Link Enum. Hort. Berol. i. 85. Calotheca sabulosa, Steud. in Flora, xii. (1829), II. 488. Crypsis maritima, Munro ex Macowan in Cape Monthly Mag. N.S. iii. (1871), Suppl. 7.

CEYLON; common on the shores, Heyne? Trimen .- DISTRIB. Westwd. to tropical

Africa and America; eastwd. to Australia

Perennial. Stem as thick as a duck's quill, branched, hard and often tortuous at the base, then erect or ascending 6-10 in. high. Leaves close-set, erecto-patent, 1-3 in. long or more, narrow and almost terete from the involute margins, very pale, glabrous or scaberulous above, striate; sheaths terete, short or long; ligule of long soft hairs. Pancle 1-4 in., subspiciform, very pale, narrow but more or less interrupted. Spikelets very shortly pedicelled; gls. all 1-nerved, keels glabrous or obscurely scabrid towards the tip; palea oblong, narrowly truncate. Grain with the pericarp loosened if moistened.—Trinius' figure represents gl. I as shorter than in the Ceylon specimens and others that I have examined. It is remarkable that this grass should have no certain habitat on the shores of continental India. There is a specimen from Heyne in Rottler's herbarium, marked "Nawulus, 21st Aug., 1794," a word which sounds more Cingalese than Indian. There is another in Mught's herbarium, where S. orientalis, spicatus, tremulus and virginicus are all fastened on the same sheet as No. 1745. S. pungens, Kunth, of the Meditorranean

region, from Spain to Egypt and Arabia, is a slight variety with a stouter dense paniele, which Dr Stapf and I have independently sought in vain to distinguish by any other character, and this is of the slightest.

7. S. glaucifolius, Hockst. in Flora, xxv. (1842) I. Bieb. 123; slender, glaucous, leaves short strict narrow flat or undulate glaucous not pungent, panicle elongate contracted white, branches very short elect, spikelets  $\gamma_d$  in. subsessile crowded, gls. I and II subequal ovate-lanceolate acuminate as long as III or lather longer. Vilfa glaucifolia, Steud. Syn. Gram. 154 V. scabritolia, Hockst ex Edgew in Journ. Linn. Soc. vi. (1862) 196, Aitchis. Cat. Panjab Pl 165. Agrostis barbata,  $\beta$ , senegalensis, Pers. Syn. i. 76. A. littoralis  $\beta$ , Lamk. Illustr. 161; Poir. Encycl. Suppl. 1. 251.

The Panjab. Dehra Ism'rel Khan, Duthie; Multan, Edgeworth. Scind, Stocks.

—Distrib. Afr. trop.

Perennal; stems 12-18 in., densely tufted. Leaves 2-5 by  $\frac{1}{10}$   $\frac{1}{8}$  in., narrowed from the cordate base to the finely accuminate tip, margins smooth, somewhat hairy towards the base; ligule a ridge of minute hairs. Paniele 3-5 in, interrupted, very pale yellowish. Spikelets very shortly pedicelled; gls. all 1-nerved, 1 and 11 hyaline, puncticulate; I rather shorter and narrower than II.—Of the synonymy cited above that of V. littoralis  $\beta$ , and the two sp. of Agrostis are taken from J. Giy's miss, on a Senegal specimen in Herb. Kew. Of V. scabryfolia I know nothing, nor where Edgeworth gets the name (which is not in the "Kew Index," but from his citing Stock's number (667) as the same plant, there is no doubt that S glaucifolius is that meant. Edgeworth (1.c. 182) mentions this amongst other plants of which the seeds are swept up for food by the poorer classes of the desert.

- \*\*\* Glume I shorter than II and III.
- † Panicle contracted. Perennials, except S. piliferus.
- 8. S. tremulus, Kunth Revis. Gram. i. 67, Enum. Pl. i. 210, Suppl. 166; stoloniferous, leaves short subulate or filtform flat or convolute paragent margins smooth, spikelets  $\frac{1}{16}$  in, gl I shorter than III lanceolate, II as long as III or longer, grain oblong. S. geniculatus, Nees ex Aitchis. Cat. Panjab Pl. 165. S. orientalis, Trim. Cat. Ceyl. Pl. 108 (non Kth.). Vilta geniculata, Nees ex Steud. Syn. Gram 156; Herb. Wight n. 3307. V. orientalis, Wight Cat. n. 1745 (in part). V. tremula, Trin Diss. i. 155; Steud. l. c. 160. Agrostis juncea, Lamk. Encycl. i. 60, Illustr. t. 41, f. 2. A. Phuldubbha, Herb. Ham. ex Wall. Cat. n. 3770. A. tenacisma, Roxb Fl. Ind. i. 316 (excl. Syn.). A. tremula, Willd. Sp. Pl. i. 372 (excl. Syn.). Zoysia? tremula, Beauv. Agrost. 148.—Sporobolus, Wall. Cat. n. 3770, 3771.

Plains of India, from the Panjub to Bengal and southwd. PEGU, Kurz.

CEYLON, Tramen .- DISTRIB. Tonkin, Cambodia.

Stems 2-6 in, many from a hard knotted stoloniferous stock, erect or prostrate, wiry; stolons 6-18 in, stout or slender, leafy, flexuous. Leaves \( \frac{3}{2} - 2 \) in., rigid, narrowed from the usually hairy base to the tip; ligule a few hairs Panicle 1-4 in., subspiciform, sometimes longer flexuous and interrupted, branches short rarely a few spreading; pedicels short. Spikelets crowded, subpersistent on the very short pedicels, very pale; glumes all 1-nerved; palea as long as its gl. Stamens 3.—A very common and variable pasture grass. Vilfa geniculata is a large state from Madras, with almost woody stems 12-18 in. long and flat leaves.

S. spicatus, Kunth Revis. Gram. i. 67, Enum. Pl. i. 210;
 stoloniferous, leaves short rigid, panicle slender cylindric, spikelets 16 in.

gl. I minute, II lanceolate acute, grain obliquely oblong. Boiss. Fl Orient. v 512. S. orientalis, Herb. Wight n. 3303, 3304, Cat n. 1745 (in part). Vilfa spicata, Beauv. Agrost. 16; Trn. Diss 1, 152, Sp. Gram. Ic. t. 12; Steud. Syn. Gram. 160. PAgrostis involuta, Poir. Encycl. Suppl. i. 252. A. spicata, Vahl Symb. i. 9; Del. Fl. Ægypt 20, t. 10, f. 1. A. virginica, Forsk. Fl. Æg, Arab. 20 (ex Kunth).—Sporobolus, Wall. Cat. n. 3773.

The DECCAN PENINSULA, Heyne; Palamcottah, Wight .- DISTRIB. Arabia, Egypt,

trop. Africa.

Stem 6-12 in., from a hard stoloniferous rootstock, stiff, strict above the geniculate base. Leaves 1-2 in., divariente, pungent, scabrid above; ligule 0. Panicle spiciform, 2-3 in. by  $\frac{1}{10} - \frac{1}{6}$  in. diam. Spikelets sessile, persistent on the branchlets, pale. Glumes hyaline, I rounded; III 1-nerved; III ovate-lanceolate; palea as long as the gl. Grain obliquely oblong or orbicular-oblong.—Agrostic involuta, Poir, referred here by Sprengel, is a Marocco plant, which may be S. virginicus or pungens.

10. S. orientalis, Kunth Enum. Pl. i. 211; stoloniferous, leaves pungent, margins serrulate, panucle narrowly oblong, spikelets  $\frac{1}{14}$ ,  $\frac{1}{12}$  in., subsessile, gl. I =  $\frac{1}{4}$  III or shorter tip rounded, II = III or longer obtuse, grain obovoid. Dalz. & Gibs Bomb Fl 295. S. humifusus, Trim. Cat. Ceyl. Pl. 108 (non Kunth). Vilfa diandra, Trin. Diss. i. 154 (evcl. Syn. Retz.). Vicentalis, Nees ex Trin. in Mem. Acad Petersh Ser. vi. Sc. Nat. v. II. (1840), 65; Wight Cat. n. 1745 (in part), Steud. Syn. Gram 156. Agrostis elongata, Roth. Nov. Sp. 41. A. orientalis, Nees Agrost. Bras 393 (excl. Syn. Roxb.). A. pungens, Herb Heyne ex Wall. Cat. n. 3772. A. tenacussima, Linn. f. Suppl. 107 (excl. Syn. Jacq.).—Spoiobolus, Wall. l.c.

The DECCAN PENINSULA, Heyne, Wight. CEYLON, at Calpentyn, Trimen.

Stem 6-18 in., base stout, hard, branching, branches and flowering stems usually geniculate below. Leave, very variable, 1-6 in., suberect or spreading, more or less pungent, glabrous or harry above; ligule 0. Pawicle 1½-4 in, erect, subspiciform or more open with here and there short horizontally spreading branches that are naked below, usually pale. Spikelets closely packed; gl. I nerveless, II and III 1-nerved.—The Ceylon and Heyne's specimens are 12-18 in. high with long flat leaves and narrow open panicles, Wight's are shorter and stouter with spiciform paucles, and closely resemble states of S. tremulus, from which the short obtuse gl. I at once distinguishes it. Although in Herb. Wight Prop. the four species mentioned in the notes to S. virginicus are all included under No 1745, S. orientalis, the latter alone bears that number in Herb. Hook, and Herb. Benth.

11. S. piliferus, Kunth Enum. Pl. i. 211 (var. a); annual, leaves hairy serrulate, panicle linear branches very short erect, spikelets  $\frac{1}{2^{1}\sigma^{-1}}\frac{1}{6}$  in., gl. I  $\frac{1}{2}-\frac{2}{3}$  III lanceolate, II longer than III oblong-lanceolate, III oblong, grain oblong compressed. S. ciliatus, Munro in Herb. Ind. Or. Hf. & T.; Duthie Grass. N.W. Ind. 29 (non Vilfa ciliata, Presl.). Vilfa pilifera, Trin. Diss. i. 157, ii. 23, Sp. Gram. Ic. t. 58. Triachyrum nilagiricum, Steud. in Hohen. Pl. Ind. Or. n. 931.—Sporobolus, Wall. Cat. n. 3774.

WESTERN HIMALAYA; from Kashmir to Nepal, alt. 3-8000 ft., Wallich, &c. The Khasia Hills, alt. 5000 ft. Mysore, at Belgaum, Ritchie. Nilghiri

HILLS, Wight, &c. MALACCA, Hervey.

Stems 3-12 in., densely tufted, erect, roots fibrous. Leaves 1-4 in., chiefly radical, narrowed from the base to the tip, flat or convolute, sparsely hairy above and at the mouth of the sheath, margins serrulate below or nearly to the tip; ligule 0. Pancele 1-3 in., strict, erect, dense-fld., often interrupted. Spikelets brown; gl. I nerveless; II and III 1-nerved, callus munute; palea oblong. Stamens 2, anthers very short.—Trinius figures this plant from a Brazilian and a Nepalese specimen.

The latter from Wallich is a very dwarf form, which is not uncommon in the Himalaya. The Brasilian is Kunth's  $\beta$ . major, is a much larger specimen, and may or may not be specifically the same. S. ciliatus, Presl, to which S. piliferus was referred by Munio, is a Panama plant, and is, I think, from the description different.

- †† Panicle open, effuse.
- 12. S. arabicus, Boiss. Diagn. Pl. Or. Ser. I. xiii. 47; perennial, stems many from a woody stoloniferous base, leaves rigid narrow, paniele pyramidal, spikelets  $\frac{1}{15}$  in. crowded subsessile at the ends of the branches, gl. I minute ovate, II ovate-oblong acute as long as III. S. pallidas, Boiss Fl. Orient v. 514 (non Lindl.); Artch. Cat. Panjab Pl. 165 (excl. Syn.) PDuthie Grass. N.W. Ind. 29, Fodd. Grass. N. Ind. 50. Vilfa pallida, Nees ex Trin. in Men. Acad. Petersb. Ser. VI. Sc. Nat. v. ii. (1840) 62; Steud. Syn. Gram. 155. V. arabica, Steud. l. c. 241.

PANJAB PLAINS; Royle, &c. WAZURISTAN, ascending to 7000 ft., Stewart-ROHILKUND, Duthie. SCIND, Stocks -- DISTRIB. Arabia, Beluchistan.

Woody base of the stem sometimes as thick as the middle finger, sending out rigid often geniculate stolons, and stout or slender flowering branches 6-24 in. high. Leaves 1-10 in. by \$\frac{1}{8}-\frac{1}{8}\$ in., narrowed from the rounded base to the tip, flat or convolute, scaberulous above, finely cilate-serrulate; ligule 0. Panicle 2-6 in. long, branches whorled, capillary, naked below. Spikelets subspicate on the branchlets, oblong, pale; gl. II and III obtuse, 1-nerved, palea as long as its gl. Grain subsplobes.—The synonymy of this plant is perplexing, owing to the double use of the specific name pallidus, and to the fact of Vilfu being now regarded as a synonym of Sporobolus. This name (pallidus) was applied by Nees in 1840 to the Arabian plant described above, under Vilfa; and by Lindley in 1848 to a very different Australian one, under Sporobolus. Bentham (Fl. Austral. vii. 623) assuming that Nees had referred his plant to Sporobolus, renamed Lindley's S. Lindleys. Lastly, Boissier, when he founded his S. arabicus, was not aware that it was Trinus's Vifa pallida, which he erroneously cites in Fl. Orient., under Sporobolus pallidus, Trin In this case the proper course appears to me to be to retain the name Sp. pallidus, Lindl., for the Australian plant, and Sp. arabicus, Boiss., for the Arabian and Indian.

13. **S. pulchellus**, Br. Prodr. 170; annual, slender, leaves narrowly lanceolate flat spinulosely serrulate, panicle oblong, branches whorled capillary few-fid towards the tips, spikelets  $\frac{1}{10}$  in shortly pedicelled, gl.  $1 = \frac{1}{2}$  II obtuse, keels of both chate, II = III broadly ovate accuminate. Kunth Revis. Gram. ii. 106, t. 123, Enum. Pl. i. 215, Suppl. 171, Benth. Fl. Austral. vii. 623. S. capillaris, Arn. ex Miq. Ann. Bot. Ind. II. 25 (non Vilfa capillaris, Wt. & Arn.) Vilta pulchella, Trin. Diss. 1. 160. Agrostis pulchella, Roth. Nov. Sp. 41. Panicum montanum, Ham. ex Wall. Cat. n. 8883—Sporobolus, Wall. l. c.

Behar, Wallich, Thomson. Chota Nagfore, Clarke.—Distrib. Australia. Stem 6 in.—2 tr., filitorm or capillary, strict, erect from the base or nearly so, distantly leafy. Leaves 2-5 in., gradually narrowed from the rounded base to the finely acuminate tip, margins with tubercle-based cilia below; ligule 0. Panicle 2-6 in., loose, whorls of many branches at regular intervals. Spikelets reddishbrown? glumes almost hyaline, obtuse. Grain globose; pericarp loose, hyaline—Bentham observes that Kunth's figure is of an unusually narrow-leaved form with the remarkable cilia not represented.

14. S. coromandelianus, Kunth Revis. Gram. i. 681, Enum. Pl. 1. 213; annual, leaves lanceolate flat spinulosely serrulate, panicle pyramidal branches whorled capillary, spikelets  $\frac{1}{20}$  in., gl. I minute

oblong or lanceolate, II = III both ovate-lanceolate acuminate. Dalz. & Gibs. Bomb. Fl. 296; Trim. Cat. Ceyl. Pl. 208; Wall. Cat. n. 3764. S. commutatus, Kunth Enum. i. 214; Mig. Fl Ind. Bat. ii. 376 (excl. Syn. pulchellus); Boiss. Fl. Orient v. 513; Aitch. Cat Panjab Pl. 165; Duthie Grass. N.W. Ind. 29. S. discosporus, Nees Fl. Afr. Austr. 158. Vilfa commutata, Trin. Diss. i. 156; Wight Cat. n. 1743. V. coromandeliana, Beauv. Agrost. 15; Trm. Sp Gram. Ic. t. 11 (ql I omitted); Steud. Syn. Gram. 153. V discospora, Trin. in Mem. Acad. Petersb. Ser. VI. Sc. Nat. ii. (1841) 59. V. Roxburghii, Nees ex Trin. l. c. V. Roxburghiana, Nees ex Wight Cat. n. 1742; Steud. Nom. Ed. II. ii. 59. Triachyrum cordofanum, Hochst. ex Steud Syn. Gram. 176. T. discosporum, Steud. l. c. Agrostis coromandeliana, Retz. Obs. iv. 19; Vahl Symb. i. 10; Roxb. Fl. Ind. i. 316. A. indica, Forsk. Fl. Æg. Arab. 104. A. Rura, Hb. Ham. ex Wall, l.c. B.

Plains of India, from the Punjab eastward to Burma, and southward to CEYLON.

-DISTRIB. Affghan. N. and S. Africa. (Texas and Mexico, introd.?).

Stems many, 4-12 in, spreading from the root, leafy. Leaves 1-3 by \(\frac{1}{3}\) in. narrowed from the subcordate base to the finely acuminate tip, spinulosely toothed especially towards the base; mouth of sheath villous Panicle very large for the size of the plant, 2-6 by 1-4 in., branches 4-6 in subsecund whorls, \(\frac{1}{2}-2\) in. long, branchlets drooping 1-2-fld. Spikelets subglobose; glumes hyaline, all 1-nerved or I nerveless. Stamens 2, anthers very short. Grain obliquely oblong or subglobose.-Nees Fl. Afr. Austr. refers Agrostis pulchella, Roth., to Sp commutatus, as var. β. Trinianus, Arn. et Nees Glum. Ind Or. ined., with panicle ovate and gl. I 5-6 times shorter than commutatus.

Var. Collettii; panicle narrowly pyramidal or conical 2-3 in. long by 1-11 in. across the lower branches, spikelets bright red-brown.—Shan Hills, Collett.

#### DOUBTFUL SPECIES.

Vilfa rigidifolia, Trin. in Mem. Acad. Petersb. Ser. vi. Sc. Nat v. II. (1840) 80 .-E Indies, Herb. Thouars — Described by Trinius as having spikelets 2 (French) lines long, which is twice as long as any Indian species known to me.

# 72. AGROSTIS, Linn.

Perennial, rarely annual grasses. Leaves usually flat. Spikelets small. 1-fld., in effuse or contracted panicles with capillary whorled branches, not jointed on their pedicels; rachilla not produced beyond gl. III. Glumes 3. I and II equal or unequal (sub-awned in A. subaristata), keeled, 1rarely 3-nerved; III membranous, 5-nerved, truncate, glabrous, awn dorsal or 0, callus glabrous or with few minute hairs; palea nearly as long as its gl. or shorter or 0, 2-nerved or nerveless. Lodicules 2. Stamens 3, anthers long or short. Grain free within the gl.—Species about 100. chiefly in N. temp. regions.

The genera Agrostis, Calamagrostis, and Deyeuvia are, as all authors agree, separated by artificial characters and are not well limited by these. It therefore becomes a question of expediency how to limit them, and the addition of many hitherto undescribed Himalayan species has not tended to aid this operation. Many authors make of Deyeuxia a section of Calamagrostis. Bentham keeps them distinct, but confines Calamagrostis to species with gl. I and II longer than III. After much study, I conclude that for taxonomic purposes, the most practical arrangement is to confine Agrosts to species with no elongation of the rachilla, and a naked or almost naked callus of gl. III (a character appreciated by most authors); to refer to Calamagrostis those with a villous callus but with no elongation of the rachilla, and to Deyeuxi, those with both a villous callus and the rachilla elongate beyond gl. III and (with a few exceptions) penicilate. I know of no species of Agrostis with the last-mentioned character of Deyeuxia, but there are species of Agrostis with longer hairs than normal in the callus, and of Calamagrostis with shorter hairs than normal; there are also species of the latter genus with a minute elongation of the rachilla, and of Deyeuxia in which that organ is short. There is no Indian Agrostis except A. myriantha with the tall coarse habit of several species of Calamagrostis and Deyeuxia, but many species of these two genera have the slender habit of Agrestis, and can only be distinguished from it by the minute characters given above. The species of Calamagrostis with the gl. III harry all over form a peculiar section, well limited by this character: their habit is altogether that of Agrostis.

- \* Palea half as long as gl. III or longer, rarely minute.
- 1. A. alba, Linn. Sp. Pl. 63; ligule oblong, flowering panicle spreading fruiting contracted, branches nearly smooth, spikelets  $\frac{1}{12}$  in, gl. I and II subequal acute, III about  $\frac{1}{7}$  shorter rarely awned, tip truncate crenate, callus quite glabrous. Kunth Enum. Pl. i. 219, Suppl. 175; Boss. Fl. Oriant. v. 514; Schrad Fl. Germ. t 2; Fl. Dan. x. t. 1623; Engl. Bot. t. 1189; T. Nees Gen. Fl. Germ. Monoc. i. n. 29; Reichb. Ic. Fl. Germ. t. 33-36; Ledeb. Fl. Ross iv. 436; Litchis. Cat. Panjab Pl. 165; Duthie Grass. N.W. Ind. 29. A. diffusa, Host Gram. Austr. iv. t. 55. A. Michauxii, Herb. Strach. & Winterb. A. mutabilis, Knapp Gram. Britt. t. 28. A. Wighti, Schmid Coll. Pl. Nilgh., Herb. Wight Propr. 1746 (in part). A. Royleana, Trin. Agrost. ii. 125.

WESTERN HIMALAYA and WESTERN TIBET, alt. 6-11,500 ft., from Kashmir to Kumaon. Sikkim, alt. 7500 ft. (introd.?). Nilghiri Hills (introd.).—Distrib. N. temp. regions.

Steins 1-3 ft., stoutly ascending from a tufted base, erect, slender. Leaves rather short, flat, nearly smooth, ligule variable in length Panicle 2-8 in. long, pyramidal. Spikelets green or purplish, usually slining; palea = about \(\frac{1}{2}\) of gl. III.—The above description applies to the common Himalayan form of A. alba, and accords with the European. I have not cited its multitudinous synonyms, of which 50 are recorded in the "Kew Index," for many apply to obscure forms or varieties none of which occur in India; except var. stolonifera (A. stolonifera, Host Gram. Austr. t. 57) of which there are Nilghiri specimens, but no doubt introduced. The awned variety y. aristata, Boiss. I. c., a widely distril ited European, American, and Asiatic plant is noted as Tibetan by Boissier, but I have seen no specimens. It is a tall form with broad leaves. Boissier describes the branches of the panicle as rough in alba, but they are smooth in all Indian specimens. Wight's n. 1746 has a minute palea.

2. A. verticillata, Vill. Fl. Delph. 74; leaves scabrid, ligule very short truncate, panicle ovate or oblong contracted or expanded dense fld., branches scabrid, spikelets  $\frac{1}{12}$  in., gls. I and II subequal subacute scaberulous keels strongly scabrid, III about  $\frac{1}{3}$  shorter not awned tip truncate toothed, palea nearly = gl., callus quite glabrous. Ledeb. Fl. Ross. iv. 438; Boiss. Fl. Orient v. 513; Trin. Diss. 1. 195, Sp. Gram. Ic. t. 36; Reichb. Ic. Fl. Germ. t. 35. A. adscendens, Lange in Kjoeb. Vidensk. Meddel. (1860) 33. A. anatolica, C. Koch in Linnæa, xxi. (1848) 379. A. densa, Bieb. Fl. Taur. Cauc. i. 56. A. diffusa, Bess. Prim. Fl. Gallic. 1. 68. A. Muelleri, Presl Bot. Bemerk. 120. A. refracta, Moench. Meth. Suppl. 60. A. stolonifera, Linn. Herb. non Sm.; Bieb. l. c. iii. 62 (ex Ledeb. l. c. 439). A. Villarsii, Poir. Encycl. Suppl. i. 251.

The Panjab; Hursa, Authorson. Kashmie; Chittapani Valley, Levinge. Simla, alt. 2-4600 ft. (Griseb.).—Distrib N. temp. regions.

Stem long slender creeping, then ascending to 10-15 in. high. Leaves rather

broad. Panicle 2-3 in., lobed, branches very short with densely fastigiate branchlets, and crowded very shortly pedicelled green spikelets.—Described as annual by Grisebach in Ledeb. Fl. Ross., but as perennial by other authors.

3. A. subaristata, Aitch. & Hemsl. in Journ. Lunn. Soc. xix. (1882), 192, t. 29, leaves scabrid, ligule long, paniele elongate contracted or subeffuse, branches short scaberulous, spikelets  $\frac{1}{12}$  in., gl. I and II subequal scaberulous tips aristulate, keels scabrid, III about  $\frac{1}{3}$  shorter, tip truncate toothed, awn 0 or minute, palea nearly as long as the gl., callus quite glabrous. Boiss. Fl. Orient. v. 514.

Kashmir, Falconer; at Sreenuggur and Nowgunji, alt. 5-6000 ft., Clarke.—DISTRIB. Afighanistan.

Stem long creeping and rooting below (as in vulgaris) then ascending, stout or slender. Panzole 3-6 in., dense- or lax-fid, branches flowering to the base. Spile-lets pale, very shortly pedicelled, often densely packed. Gl. I and II membranous, with the median nerve sometimes produced into a very short awn; III dorsally awned in Affghan specimens.—Apparently a very distinct species, strongly resembling A. vulgaris in habit; the awned gl. I and II are found in no other Indian species. The Affghan specimens have larger and more scabird subhispid spikelets.

4. A. peninsularis, Hook.f.; tall, very slender, erect, leaves very narrow strict, ligule short, panicle as broad as long very lax and open, branches 2-4-nate and branchlets long capillary simple in the lower half or more then very sparingly branched and tew-fld., spikelets  $\frac{1}{8}$  in., gl. I and II subequal, III nearly = II strongly 4-nerved tip truncate 2-aristulate, awn basal exserted, callus very shortly bearded, palea = gl. III lanceolate 2-nerved, anther as long as the gl. A. Hookeriana, Herb. Wight.

DECCAN PENINSULA, Wight (Cat. n. 1746, in part); ? Pulney Mts., Wight. Stem 2 ft. or more, erect from the very base, stiff, leafy upwards. Leaves flat, 3-4 by \(\frac{1}{6}\) in., erect, finely acuminate, nearly smooth. Panicle 3-4 in., branches in distant whorls, perfectly smooth. Spikelets green or purple. Anthers very large, purple, tips of cells almost beaked.—The Pulney plant has narrower more acuminate gl. I and II than the others, and III is shorter in proportion, but it is otherwise identical; its stamens are imperfect. Closely resembles Calamagrostis pilosula.

- \*\* Palea short or 0.
- + Gl. III awned.
- 5. A. canina, Linn. Sp. Pl. 62; radical leaves narrow convolute cauline very narrow, ligule oblong, panicle oblong or ovate spreading in fl. contracted in frt., branches lax-fld., spikelets  $\frac{1}{12} \frac{1}{10}$  in., gl. I and II unequal lanceolate acute or acuminate, III  $\frac{1}{4}$  shorter tip truncate 4-toothed, awn median to basal, palea 0, callus glabrous, anthers long. Kunth Enum. Pl. 1. 222; Host Gram. Austr. iv. t. 53; Engl. Bot. t. 1856; Knapp Gram. Britt. t. 21; Reichb. Ic. Fl. Germ. t. 33; T. Nees Gen. Fl. Germ. Monocot. i. n. 29; Duthie Grass. N.W. Ind. 29; Ledeb. Fl. Ross. iv. 440; Boiss. Fl. Orient. v. 516. Trichodium caninum, Schrad. Fl. Germ. i. 198 Agraulus caninus, Beauv Agrost 5, t. 4, f. 7.

WESTERN HIMALAYA and WESTERN TIBET; Kashmir, alt. 9-12,000 ft., Clarke, Duthie; Lahul, Hay. Nilghiri Hills, alt. 8000 ft, Clarke (introd. 9).—Distrib. N. temp. regions

Stem 1-2 ft. very slender, rarely stoloniferous. Leaves \(\frac{1}{10}\) in. broad. Panicle 2-4 in; branches capillary, scaberulous or nearly smooth. Spikelets green, pale or purple, awn exserted, geniculate; callus sometimes minutely scabrid.—There are appeared of 30 recorded synonyms of this plant.

6. A. brachiata, Munro mss.; tall, very slender, leaves long, ligule very small, panicle effuse, branches branchlets and pedicels capillary divaricate, spikelets  $\frac{1}{16}$  in. few distant very long-pedicelled, gl. I and II subequal oblong subacute, III nearly as long narrowly truncate, callus quite glabrous, awn median.—Sporobolus, Wall. Cat. n. 3769 B.

BEHAE; at Monghyr, Wallich.

Stem 2-3 ft. high or more, as slender as a sparrow's quill, weak and probably decumbent on bushes, internodes 6 in. long. Leaves 6-8 by  $\frac{1}{6}-\frac{1}{4}$  in., finely acuminate, contracted towards the base, thin and flaccid. Panucle 6-12 in., quite smooth, branches 2-2½ in. long, opposite or in distant whorls of 3-5, horizontal; pedicels  $\frac{1}{6}-\frac{1}{4}$  in. Gl. I and II equal, cymbiform; III as long as I and II, 5-nerved, mid-nerve reaching half way up; palea minute. Grain oblong, compressed, as long as the gl.—An extraordinarily delicate species, quite unlike any other and more resembling a Sporobolus. The specimens are advanced, in frt, and I have seen no awn, or any other indication of one except the shortened median nerve.

7. A. filipes, Hook. f.; very slender, leaves short very narrow, ligule very short, panicle very narrow elongate, branches short alternate and 2-3-nate erect smooth, spikelets  $\frac{1}{14}$   $\frac{1}{12}$  in. shortly pedicelled erect, gl. I and II unequal acute, III  $\frac{1}{3}$  shorter tup truncate nearly entire, callus quite glabrous, awn dorsal from above the middle geneculate, palea minute.

KHASIA HILLS, alt. 5-6000 ft., in several places, Clarke.

Stem 8-15 in., erect or geniculate below, densely tufted, base hard. Radical leaves many, tufted, 1-2 in., subulate, cauline rather longer and broader. Panicle 2-4 in., interrupted; branchlets \(\frac{1}{2}\)-\frac{1}{2}\) in., capillary, shortly naked below, smooth. Spikelets green or pale reddish; gl. I and II with scabrid keels; awn shortly exserted. Anthers very short. Grain ovoid, acute.—Nearest to A. canina, but the long very narrow interrupted panicle is constant in all the specimens from five distant localities at different elevations.

Var. ? palea 0, grain linear-oblong. A. nervosa, Nees, var. aristata, Munro in

Herb. Kew .- Sikkim; at Lachoong, alt 9000 ft.

8. A. Hookeriana, Clarke mss. (non Munro); very slender, leaves very narrow flaccid, ligule oblong, panicle broad with rather distant whorls of few very long flexuous capillary branches naked and unbranched for half their length, spikelets  $\frac{1}{10} - \frac{1}{8}$  in., gl. I and II unequal lanceolate acuminate, III about  $\frac{1}{8}$  shorter tip truncate denticulate, callus glabrous or minutely hairy, awn dorsal.

SIKKIM HIMALAYA, alt. 9-11,000 ft., in meadows, J. D. H. Cummins (in Herb. Clarks).

Stem 1-2 ft. Leaves 2-6 in., flat,  $\frac{1}{13}$  in. broad. Panicle 2-6 in., branches 2-3 in., minutely scaberulous; pedicels as long as the spikelets or longer. Spikelets green, rather distant; awn exserted; callus sometimes distinctly but minutely bearded. Anthers linear. Grain oblong.—Spikelets very much larger than in the foregoing species. This is not A. Hookerana, Munro ex Duthie Grass. N.W. Ind. 30, nor Lachnagrostis Hookerana, Nees ex Steud. Syn. Gram. 192.

†† Gl. III not awned.

9. **A. micrantha,** Steud. Syn. Gram. 70; tall, rather slender, leaves narrow, ligule oblong, panicle elongate inclined contracted in fl., branches long capillary smooth spreading in fruit, spikelets  $\frac{1}{16} - \frac{1}{12}$  in., gl. I and II unequal oblong-lanceolate acute, III  $\frac{1}{4} - \frac{1}{3}$  shorter tip truncate crenate callus

quite naked, nerves very faint, palea = about \(\frac{1}{4}\) gl., anthers about \(\frac{1}{3}\) gl.—A. Wightii, Munro in Herb. Hook. f. & T. in part).—Agrostis, Wall. Cat. n. 3776.

CENTRAL HIMALAYA, alt. 4-6000 ft., from Garwhal to Sikkim. ?Khasia Hills, alt. 5000 ft., Clarke.

Stem 2-3 ft., tufted, rather stout below in Wallich's specimens. Leaves 3-6 in., by  $\frac{1}{10-6}$  in., rarely broader, scaberulous. Panucle 4-10 in., lax-fid., slightly scaberulous, branches naked till towards the tips, lower whorled or fascicled; top of pedicels clavate. Spikelets green, gl. III 5-nerved, nerves all very slender or evanescent, the median sometimes arrested half way. Grain linear-oblong.—Steudel describes the palea as long as the gl., but it never exceeds  $\frac{1}{2}$  of that organ. The Khasian specimens have a much reduced panicle and much smaller palea.

10. **A.** myriantha, Hook. f; stems stout leafy, leaves broadly linear-lanceolate, ligule short, panicle 4-12 in inclined contracted many-and dense-fid., rachis rather stout, branches fascicled or whorled often fig to the base, spikelets  $\frac{1}{20}$ ,  $\frac{1}{10}$  in., gl I and II subequal oblong subacute, III nearly as long tip truncate crenate, nerves very faint, callus quite naked, palea =  $\frac{1}{4}$ - $\frac{1}{3}$  gl., anthers  $\frac{1}{3}$ - $\frac{2}{3}$  gl.—Agrostis, n. 7 Herb. Hook. f. § T.

SIKKIM HIMALAYA; alt. 9-12,000 ft., common. Khasia Hills, alt. 4-6000 ft., common.

Stem 1-5 ft., suberect or geniculate below. Leaves 4-12 by \$\frac{1}{8}\$-1\frac{1}{8}\$ in , scaberulous. Panicle 6-12 in., contracted in flower, less so in frt.; branches very many in many fascicles, strict, erect, sometimes naked for half their length. Spikelets pale green, or brownish shortly pedicelled, gl. I and II scaberulous on the keels; II 5-nerved, nerves anthers palea and grain as in A. micrantha.—Very near A. micrantha, but a much more leafy species, with shorter and broader gl. I and II, and III longer in proportion.

Var. silkimensis; stem 1-2 ft., leaves 4-8 by  $\frac{1}{6} - \frac{1}{6}$  in., ligule oblong, anthers =

the gl.—Sikkim, common in woods.

Var. khasiana; stem 3-5 ft., sometimes as thick as a goose-quill below, leaves 6-12 by  $\frac{1}{4} - \frac{1}{2}$  in, ligule often 0, panicle up to 12 in., anthers =  $\frac{2}{3}$  the gl.—Khasia Hills, abundant.

11. **A. Clarkei**, Hook. f.; very slender, leaves very narrow, ligule short, panicle broadly pyramidal, branches capillary spreading sparingly divided, spikelets  $\frac{1}{12} - \frac{1}{10}$  in., gl. I and II very unequal narrowly lanceolate acuminate, III much shorter than II 5-nerved nerves slender, tip truncate crenate, callus quite glabrous, palea very minute or 0. A. canina, *Munro in Herb. Ind. Or. Hf. & T. (m. part)*.

Western Himalaya; Herb. Royle; Sikkim, alt. 9-11,000 ft., J. D. H., Clarke,

Stem 6-14 in., suberect. Lowest leaves filiform, upper flat, all very narrow, scaberulous. Pancle 1½-7 in., brauches spreading in fl. and frt., smooth or nearly so, naked below, lower geminate or in whorls of 3-5 Spikelets narrow, green purplish or very dark purple; gl I ½ or more longer than II, very finely acuminate, keel scabiid; III short and broad.—Regarded by Mr. Clarke as an awnless form of A. canna, but besides wanting the awn, gl. I and II are narrower and more acuminate, and III much shorter.

12. A. inæquiglumis, Griseb. in Goett. Nachr. (1868) 80; stems 4-6 in. densely tufted stiff stout, leaves filiform or nearly so, liggule short, panicle spiciform dense-fid, branches very short, spikelets  $\frac{1}{12}$  in., gl. I and II unequal ovate-lanceolate acute, III  $\frac{1}{4}$  shorter than II tip parrowly vol. vii.

truncate crenate, callus quite naked, palea minute or 0, anthers short. Agrostis n. 10, Herb. Ind. Or. Hook. f. & Thoms

SIKKIM HIMALAYA; alt. 12-16,000 ft., J D. H., Clarke, &c.

Stem 4-6, rarely 8 in. Leaves usually convolute, upper sometimes flat, not  $\frac{1}{12}$  in. broad; lower sheaths green or purple. Pancle 1-2 in , strict, branches stout densely imbricating, fig. to the base. Spikelets very shortly and stoutly pedicelled, green or dark purple .- A very common alpine grass, constant in habit at all elevations.

13 A. divaricata, Griseb. in Goett. Nachr. (1868) 82; stems 4-6 in densely tufted capillary, leaves capillary, paniele small with widely spreading divaricate sparingly divided branches and capillary pedicels, spikelets \( \frac{1}{18} \)\_1 in., gl I and II very unequal ovate-lanceolate, I acute, II acuminate, III about & shorter than II tip truncate crenulate, nerves very faint, callus quite glabrous, palea most minute orbicular, anthers short Herb. Ind. Or. Hf. & T. No. 11.

SIKKIM HIMALAYA, Yeumtong, on moist banks, alt 13,000 ft., J. D. H

The most delicate little species known to me, resembling Arra caryophyllea in size and slenderness, but growing in dense tufts Leaves about 1 in, convolute, flexuous; ligule short, oblong. Panicle about 1 in. long and broad, branches geminate, quite smooth Spikelets remote, purple, keels of gl I and II scabrid, pedicels rather long. Grain oblong.—A single specimen of a Sikkim Agrostis in Herb. Calcutta (n. 663 in part) without further habitat, resembles this in the small stature and panicle, but has a much stouter stem, and flat leaves about 10 18 in. gl. I and II are more obtuse. More specimens of both are much wanted.

#### DOUBTFUL SPECIES.

A. NERVOSA, Nees ex Trin. in Mem. Acad. Peter.b. Ser. VI. vi. II (1845) 328; Steud. Syn. Gram. 165; Duthie Grass. N.W. Ind. 30; leaves flat, ligule very short, panicle 4 in. lower branches 4-nate naked below, gl. I and II subequal hardly  $\frac{1}{12}$  in. acute, III  $\frac{1}{3}$  shorter, awn 0, palea rather shorter than the ovary, callus very shortly retrorsely pilose.—Nepal. (See Calamagrostis pilosula).

A. PROCERA, Retz. Obs. iv. 19. ? Thysanolana Agrostis.

A. Wightii, Nees ex Steud. l.c. 168; leaves flat margins scabrous, ligule

ovate, panicle long capillary, branches 2-4-nate, branchlets 2-3-chotomous scabrid, gl. I and II equal subobtuse, keel scabrid III = II 3-denticulate, palea rather longer than the ovary ovate-lanceolate acute. Vilfa vulgaris, Wight Herb. 78 (ex Steud.).

A. Zenkeri, Steud. L.c. 170; stem exceedingly slender scaberulous above, leaves 1-13 in erect strict convolute retrorsely scabrid, ligule obtuse, panicle pyramidal, rays 2-nate widely spreading, spikelets 11 line purple, gl. I and II equal acute, III as long shortly denticulate 5-nerved awn 0, palea as long 2-nerved, callus hairy all over .- Nilghiri Hills.

# 73. MUEHLENBERGIA, Schreb.

Annual or perennial very slender grasses. Leaves narrow, flat. Spikelets very numerous and minute, 1-fld., panicled, terete, not jointed on their pedicels; rachilla jointed at the base, not produced. Glumes 3, I and II persistent, equal or unequal, 1-nerved; III as long or longer than I and II, terete, membranous, 3-nerved, hairy below the middle, tip acute or minutely 2-toothed awned. awn very slender not twisted; palea oblong, as long as the gl or longer, 2-nerved, nerves almost meeting in the tip; callus minute. Lodicules 2, very minute. Inthers short or long. Styles free, stigmas short. Grain cylindric, free in the gl. and palea.—Species about 60 chiefly temp. American.

The above character applies to the Indian species; of the American-some have only one empty gl., in others gl. III is awnless or 5-nerved.

1. M. sylvatica, Torr. & Gr. ex Trin. in Mem. Acad. Petersb. Ser. VI. vi. II. (1845) 292 (excl. syn. viridissima); panicle erect contracted interrupted, branches very short fig. to the base, spikelets very shortly pedicelled, gl. I and II  $\frac{1}{12}-\frac{1}{10}$  in lanceolate acuminate, III about as long, awn  $\frac{1}{6}-\frac{1}{2}$  in. Steud Syn. Gram 179; A. Gray Man. Bot N. U St. 612, 8; Duthie Grass. N.W. Ind. 28 M. Duthiæana, Hack. in Herb. Duthie. Agrostis diffusa, Muehlb. Descr. Gram. 64. A sylvatica, Torrey Fl N. Am. i. 87 (non Linn.).

WESTERN HIMALAYA; from Kashmir to Kumaon, alt. 4-9000 ft., Royle, &c .-

DISTRIB. Japan, N. Am.

Stem 1-3 ft., very slender, branched, decumbent and creeping below. Leaves 3-5 by  $\frac{1}{10-6}$  in., smooth or scaberulous; ligule very short, lacerate. Pancle 4-6 in., pale green or violet; rachis and very short erect branches and pedicels scabrid. Spikelets crowded, erect; gls. I and II subequal, 1-3-nerved, keels scabrid; III minutely notched at the tip, hairs much shorter than the gl.; palea about as long as its gl.

2. M. viridissima, Nees ex Stend. Syn. Gram. 178; panicle elongate much fastigiately branched flexuous interrupted branches and pedicels slender, gls. I and II  $\frac{1}{10}$  16 in. equal or unequal, III twice as long or longer, awn  $\frac{1}{3}$ -1 in. Duthie Grass. N.W. Ind. 28. M. Huegelii, Trin. in Mem. Acad. Petersb. Ser. VI. vi. II. (1845) 293. M. geniculata, Nees ex Stend. Syn. Gram. 178; Duthie I. c.—Podosaemum, Wall. Cat. n. 3778.

TEMPERATE HIMALAYA, alt. 3-9000 ft., from Kashmir to Sikkim and the Khasia Hills.

Habit of *M. sylvatica*, but usually a larger grass, with longer broader leaves and a loose interrupted flexuous bright green paniele often a foot long. *Spikelets* shortly pedicelled; gls. I and II very variable, both ovate-lanceolate 1-nerved and shortly awned with scabrid keels and awn, or I much smaller oblong or orbicular crose and nerveless.

3. **M.** himalayensis, Hack. in Herb. Duthie n. 10,128; panicle elongate much fastigiately branched interrupted, branches and pedicels slender, gls. I and II  $\frac{1}{6}-\frac{1}{6}$  in. subequal lanceolate acuminate or subaristate, III as long as I and II or rather longer, awn  $\frac{1}{2}-1$  in.

WESTERN HIMALAYA, alt. 6-7000 ft., from Chamba to Simla, Thomson,

Madden, &c.

Stem 12-18 in , very slender, decumbent or ascending, branched. Leaves narrow, flaccid; ligule oblong. Panacle 3-6 in., very narrow, slender, flexuous, flaccid, branches distant. Spikelets bright green, glistening, larger than in sylvatica and viridissima to which latter it is most nearly allied, differing in being more slender with narrower leaves, in the larer, fewer fld. panicle, in the larger spikelets, and in gl. III not being much longer than I and II.

s 2

## 74. CALAMAGROSTIS, Adans.

Stout or slender grasses. Leaves narrow. Spikelets in narrow or effuse panicles, 1-fld., not jointed on the pedicels; rachilla jointed at the base, not produced beyond gl. III. Glumes 3, I and II equal or unequal, lanceolate, acumi ate, glabrous or scaberulous; III shorter, hyaline, truncate, crenate or cleft, glabrous or hairy, awned, paleate; palea often minute. rarely 0; callus bearded with long or short hairs.—Species about 15 f natives of cold and temp. climates.

See remarks under Agrostis (p. 253). See also Deyeusia abnormis, which is intermediate between that genus and Calamagrostis.

- \* Glume III glabrous.
- † Hairs of callus longer than gl. III.
- § Glume III dorsally awned at the middle or below it.
- 1. C. epigejos, Roth. Tent. Fl. Germ. i. 34; stem stout creeping below, leaves glaucous scaberulous, ligule long acute, panicle dense, branches scaberulous, spikelets  $\frac{1}{5}-\frac{1}{4}$  in, gl. I and II subequal subulatelanceolate, III =  $\frac{1}{3}$  II tip 2-fid, awn dorsal at or near the middle, palea =  $\frac{1}{4}$  gl. III, hairs of callus as long as gls I and II Kunth Enum Pl. 237, Suppl. 184; Host Gram Austr. iv. 24, t. 42 Reichb. Ic. Fl. Germ t. 43; Ledeb. Fl. Ross. iv 432; Boiss. Fl. Orient. v 525; Duthre Grass N.W. Ind. 30. C. georgica & thyrsoides, C. Koch in Linneu, xxi. (1848) 387, 388. C. glomerata, Boiss. et Buhse in Mem. Soc. Nat. Mosc. xii. (1860) 229. C. lithuanica & vilneensis. Schult. Mant iii 602. C lanceolata, Stokes in With Arr Brit. Pl. Ed. III ii. 122. C. glauca & Huebneriana, Reichb. Fl. Germ Eccurs. 27, Ic. Fl. Germ. t. 43. C. rigens, Fries Summ. Veg. Scand 240. Arundo epigejos, Linn Sp. Pl. 81; Engl. Bot. t. 402; Fl. Dan t. 2165; Knapp Gram. Britt. t. 97.

KASHMIR, alt. 8-14,000 ft., Fulconer, &c.-DISTRIB. N. Asia. Europe S. Africa.

Stem 2-4 ft., erect, usually stout. Leaves long, narrow, finely acuminate, scaberulous, more or less glaucous; ligule oblong, rather long, acute. Panicle 6-12 in. or more, oblong or lancedate, much branched, branches usually erect. Spikelets shortly pedicelled, erect, green or light or dark purple; gl. I and II subequal or II the longest, 1-nerved or II 3-nerved, keel and often margins scaberulous; III glabrous, smooth or scaberulous, awn equalling its gl.

2. **C. decora**, Hook f.; stems tall tufted very slender, leaves very long flat, panicle loosely branched, spikelets  $\frac{1}{5}$  in , gls. I and II subequal lanceolate, scaberulous, III  $= \frac{2}{3} - \frac{3}{4}$  I truncate 4-cuspidate, awn subbasal exserted, palea as long as the gl., callus hairs rather longer than gl. III.

KASHMIR; Astor Valley, alt. 9-10,000 ft., Duthie (n. 12,660).

Stem 4-5 ft. or more. Leaves 12-18 by ½ in., scaberulous, pale green; sheath smooth; ligule large, oblong, rounded. Panicle 3-8 in., pale green, rachis slender and fascicled branches scaberulous, branches naked below Spikelets shortly pedicelled, subspect; gls. I and II hardly membranous, finely acuminate, keels scaberulous, I 3-nerved; III glabrous, except the callus; awn shortly exserted. Anthers linear.

- §§ Glume III awned in the upper third or tip.
- 3. C. emodensis, Griseb. in Goett. Nachr. (1868) 80; stem stout creeping below, leaves long broad flat glaucous scaberulous, panicle dense or effuse much-branched, spikelets 1 in. crowded, gl. I and II unequal subulate-lanceolate, III = \frac{1}{2} I cleft to about the upper \frac{1}{2} awned in the cleft, awn exserted, palea = \frac{2}{3} - \frac{1}{4} its gl. C. nepalensis, Herb. Strach. & Winterb. (in part). Calamagrostis, Wall. Cat. n. 3781 B.

TEMPERATE HIMALAYA, alt. 7-12,000 ft, from Kashmir to Bhotan, Falconer, &c.

Stem 3-5 ft., as thick as a goose-quill below. Leaves 12-18 by \(\frac{1}{2}-\frac{3}{2}\) in., thinly corraceous, pale glancous green, many-nerved; sheath nearly smooth or scaberulous: ligule oblong, membranous. Panicle 6-10 in., inclined or nodding, very soft, shining and silky, pale grey; branches branchlets and very short pedicels capillary, smooth, or minutely scaberulous. Glumes I and II very thin, smooth, keels scaberulous, I 1-nerved; II 3-nerved; III glabrous, hyalme, usually cleft from the upper third into two lanceolate subulate-acuminate lobes; but the lobes are sometimes irregularly lacerate at the tip; nerves 5, faint.

4. C. littorea, DC. Fl. Franc. v. 255; stem stout or slender creeping below, leaves narrow scaberulous often convolute, ligule oblong, panicle dense or effuse, spikelets  $\frac{1}{3}-\frac{1}{4}$  in., gl. I and II unequal subulate-lanceolate scaberulous, III =  $\frac{1}{4}-\frac{2}{3}$  I tip truncate erose or toothed, awn terminal in a notch or short cleft or dorsal below the tip included, palea nearly as long as the gl. Kunth Enum. Pl. i. 237; Reichb. Ic. Fl. Germ t. 42; Borss. Fl. Orient. v 524, Steud. Syn. Gram. 187. C. glauca, Reichb. Fl Germ. Excurs. 27. C. lanceolata, Aitchis. in Journ. Linn Soc. xviii. (1880) 107 (non Roth.). C. laxa, Host Gram. Austr. iv. 25, t. 43, Ledeb. Fl Ross v. 432, Herb. Ind. Or. Hf. & T (in part); Griseb in Goett. Nachr. (1868) 80. C. nepalensis, Nees ex Steud. Syn. Gram 193; Duthie Grass. N. W. Ind. 30; Artchrs in Trans. Linn. Soc. Ser. II. Bot. iii. 124. Arundo glauca, M. Bieb. Fl. Taur. Cauc. 1. 79. A. laxa, Roem. & Sch. Syst. ii. 502. A. littorea, Schrad. Fl. Germ. i. 212, t. 4, f. 2.—Calamagrostis. Wall. Cat. n. 3781 A.

TEMPERATE HIMALAYA, alt. 6-10,000 ft. from Kashmir to Sikkim. Western

Tibet, alt 10-12,000 ft -Distrib. Europe, N. and W. Asia

Stem 2-5 ft., erect, as thick as a crow-quill or small goose-quill, but sometimes very slender. Leaves 12-18 by 12-1 in , firm, smooth or scaberulous, flat or convolute; sheaths smooth; ligule linear-oblong. Panicle very variable in form and composition, erect or inclined, green or purple, rachis and branches scaberulous. Spikelets rarely 1 in. long, sometimes only 1 in., when the outer glumes are broader; gl. I and II with scaberulous keels, I usually about & longer than II, but sometimes subequal, I 1-nerved and II 3-nerved at the base, but both sometimes 3-nerved; III glabrous, smooth or faintly scaberulous, faintly 5-nerved; awn very slender, variable in length, rarely longer than its gl .- A very difficult plant to define satisfactorily so much do the spikelets vary in size, in the breadth of the empty gls., and in the incision of the top of gl. III, which is either rounded and obtusely 2-toothed with an awn in the sinus, or truncate with a terminal awn, or 2-lobed nearly 1 way down with lobes irregularly incised and the awn in the sinus, or finally the awn may be strictly dorsal below the truncate tip. Dr. Stapf, who has revised the whole of the Indian material which I had referred to this species, confirms the above view of its variation, and agrees with me in referring it to the European C littoria.

Var. tartarica; stem shorter stouter, leaves convolute, panicle strict narrowly

oblong densc-fid., spikelets usually dark purple. C. tartarica, Jacquem. mss. C. laxa, var. robustior, Heib. Hf. & T.—Common in the drier districts especially in Western Tibet.

5. **C. Stolizkai**, *Hook. f.*; stem short stout, leaves erect convolute, panicle short oblong contracted dense, spikelets  $\frac{1}{6}$  in. shortly pedicelled, gl. I and II subequal lanceolate acuminate scaberulous, III about  $\frac{1}{3}$  shorter than II tip truncate 4-aristulate, awn terminal exserted, palea as long as its gl., hairs of callus rather longer than gl. III shorter than I and II.

WESTERN TIBET; Zanskar, on the Pensi-la, alt. 12-15,000 ft., Stolucka.

Stem 18-24 in, erect. Leaves 3-6 by  $\frac{1}{6}-\frac{1}{4}$  in., very scabrid above; sheaths scaberulous; ligule oblong. Panicle 4 in.; branches short erect or suberect, scabrid. Spikelets erect, crowded, pale, shining; gl. I and II hyaline, sub 3-nerved; III glabrous, hairs of callus unequal in length; awn about twice as long as the spikelet, straight, shortly exserted.—I have seen only two specimens.

6. **C. debilis**, Hook. f; very slender, leaves short very narrow, panicle narrow, branches few rather short laxly flowering and pedicels capillary, spikelets  $\frac{1}{5}$  in pale, gls I and II unequal lanceolate acuminate keels quite smooth, III about  $\frac{1}{3}$  shorter than II or less, tip truncate erose, awn dorsal in upper third of the gl. exserted, palea as long as its gl., hairs of callus = gl. I and II.

SIEKIM HIMALAYA; Chola, alt. 11,000 ft., J. D. H.

Stem 12-18 in., tufted, geniculate below. Leaves distant, 1-2 by \( \frac{1}{16} \) \( \frac{1}{12} \) in., flat, quite smooth, upper shorter spreading; sheath smooth; ligule oblong. Panicle 2-5 in., branches and branchlets smooth. Spukelets pale purplish brown, long-pedicelled; gl. I and II 1-nerved; III glabrous, 5-nerved. Anthers very small.—I found this very delicate species only once and then late in the season, the very small anthers are peculiar.

†† Hairs of callus much shorter than gl. III.

7 **C.** tripilifera,  $Hook\ f$ ; very slender, leaves short narrow flat, panicle of few very long wide spreading 2-3-nate branches sparingly divided towards the ends, spikelets  $\frac{1}{6}$  in. long-pedicelled, gls. I and II subequal lanceolate acuminate, III firm  $\frac{1}{3}$  shorter than I tip truncate with 2 short lateral awns and a median dorsal exserted awn, palea  $\frac{1}{3}$  shorter than its gl., hairs of callus very unequal.

SIRKIM HIMALAYA; in the drier interior, alt 10-13,000 ft. J. D. H., Clarke, King's Collector.

Stem tufted, 8-18 in., erect, hardly thicker than pack-thread. Leaves 4-6 by \( \frac{1}{16} \) in., rather flaccid, quite smooth; sheaths smooth; ligule oblong. Panicle with few whorls of few quite smooth capillary branches 1-2 in long each bearing 3-5 glistening pale yellow on dull purplish spikelets on pedicels longer than themselves; gls. I and II 1-nerved, quite smooth, even the keels, III glabrous, rather strongly 4-nerved, tip with mucros between the lateral and middle awns, the latter of which is stiff and nearly twice as long as its gl.; callus hairs nearly half as long as gl. III.

Var. Cummissi; panicle contracted, branches much stouter appressed to the rachis, spikelets 10-18 in.—N.E. Sikkim, Cummiss.—Perhaps a different species, but the stems, about a span long, being curved in a semicircle, show that the plant

has grown under unfavourable conditions.

- \*\* Glume III hairy all over; callus hairs shorter than gl. III.
- † Palea of gl. III nearly as long as its gl.
- 8. C. Munroana, Boiss. Fl. Orient. v. 523; very slender, leaves long narrow, panicle effuse or contracted, spikelets 16-10 in., gls. I and II subequal oblong-lanceolate acute 1-nerved, keels nearly smooth, III = 3 I broadly truncate crenate, awn short infra-median included or O, callus shortly hairy, anthers short Agrostis ciliata, Herb. Strackey & Winterbottom; Herb Ind Or. Hf. & T. in part; PDuthie Grass. N.W. Ind. 29 (non Nees). A. Munroana, Aitch & Hemsl in Journ Linn Soc. xix. (1882) 192. A. pilosula, Hack. in Herb. Duthie n. 6231 (non Trin.). A. Royleana, Duthie 1 c. 30.

WESTERN HIMALAYA, from Kashmir to Kumaon, alt. 8-12,000 ft., Royle, &c. -DISTRIB Affghan

Stems 6-18 in., tufted, roots fibrous. Leaves 2-8 in., scaberulous or nearly smooth, flaccid, or in high altitudes strict; sheaths nearly smooth; ligule variable. Pancle 2-5 in , oblong or pyramidal ; branches capillary, erect or spreading, lower fascicled or 2-3-nate, smooth or minutely scaberulous, lower often long spreading and naked below. Spikelets pedicelled, green or purplish; gl. I and II very thin, smooth; III hairy all over; palea as long as its gl. or 1 shorter.—A very variable plant, one of two (the other is *C. pilosula*) which have been referred by Munro and others to *Agrostis Royleana*, Trin., a plant described by Trinius as having the bearded rachilla proper to Deyeuma (see end of genus). I have in vain sought to identify Munroana with any other of the Roylean species, none of which are accurately described.

Var. stricta; stem 6-10 in. strict, leaves very narrow rather stiff erect, panicie contracted, branches short erect or spreading, pedicels very short, spikelets green or purple, gl. III always awned. Agrostis No 4, Herb. Strach. & Winterb .-Common at altitudes of 11-15,000 ft. Though differing entirely in habit from the lax open panicled form of Munroana, I feel sure that this is only the alpine form of that plant from intermediates occurring between them. It resembles Agrostis inæquiglumis, Griseb.

9. C. Griffithiana, Hook. f.; tall, erect, leaves long narrow subcoriaceous, panicle long narrow branches suberect, spikelets in., gl. I and II subequal lanceolate acute, III narrow tip truncate with 4 short bristles the lateral longest, awn subbasal to median exserted, hairs of callus very short, anthers linear. C. Hookeriana, var. aspera, Munro in Herb. Hf. & T. Agrostis Royleana, Munro in Herb. Strach. & Winterb. n. 2. Lachnagrostis Griffithiana, Munro Cat. Pl. Griff. Falc. &c. 67 ined. Devenxia Griffithii, Munro l. c. 56.

WESTERN HIMALAYA; Kumaon, alt. 5500 ft., Strachey & Winterb. KHASIA

Hills, alt. 5000 ft., Griffith (Kew distrib. n. 6598), Hf. & T. &c.

Stem 2-3 ft, quite erect, as thick as a crow-quill. Leaves 6-10 by \(\frac{1}{2}\)-\frac{1}{3} in., and sheaths smooth or subscaberulous; ligule very short Panicle erect; branches 2-4 in , 2-5-nate, naked for half their length, then with crowded branchlets and shortly pedicelled green or purplish spikelets. Spikelets ; in , III harry all over; palea nearly as long as its gl.-A much taller and stouter plant than any form of C. Munroana, with much larger spikelets, short callus hairs, and linear anthers. A fourth imperfect gl. sometimes occurs.

- †† Palea of gl. III very short, rarely =  $\frac{1}{2}$  its gl.
- 10. C. pilosula, Hook. f.; stem very slender erect, leaves long

narrow fiat, paniele effuse or contracted, branches long or short suberect or spreading, spikelets  $\frac{1}{10} - \frac{1}{8}$  in., gl. I and II subequal oblong-lanceolate acute or acuminate 1-nerved smooth, III oblong tip truncate erose or crenate with sometimes 4 minute setulae, awn subbasal exserted, hairs of callus =  $\frac{1}{8}$  gl. III or shorter, anthers linear. Agrostis pilosula, Trin. in Mem. Acad. Petersb. Ser. VI vi. II. (1845) 372.

TEMPERATE and ALPINE HIMALAYA, alt. 6-14,000 ft., from Kashmir to Sikkim. NILGHIRI HILLS, alt. 3-6000 ft., Wight, Schmid, Jacquemont, &c. Ceylon, alt.

6-8000, Walker, &c.

Stems 1-3 ft. or more, tufted, 6-10 in. in alpine specimens, erect from a short inclined base. Leaves variable in breadth, up to 1 in., but usually very narrow, flaccid, smooth or subscaberulous; sheath smooth; ligule very variable, longest in the upper leaves. Panicle very variable, large and effuse with spreading branches 1-4 in. long naked below and with loosely crowded spikelets at the extremities, or contracted with suberect shorter branches, or short broadly ovate or triangular, branches branchlets and pedicels minutely scabrid. Spikelets membranous, green and glistening in the larger forms, purple in others and more herbaceous in the alpine; gl. I and II smooth or subscaberulous, I rather the shortest, keels near or quite smooth, rarely scabrous; III  $\frac{1}{4}$  shorter than I, hyaline, hairy all over, nerves often indistinct; palea usually very minute, rarely nearly half as long as its gl.; awn more or less exserted .- A very variable grass of which Wallich's No. 3775 A from Nepal, with spikelets 12 in. long may be regarded as the type; his B has rather larger spikelets, but is not otherwise different. I am far from supposing that I have succeeded in unravelling its synonymy which is inextricably confused with C. Munroana Agrostis alba and others. The following are marked forms in their typical states as defined, but they pass into one another.

Var. Wallichiana; very slender, leaves narrow sometimes filiform smooth, panicle 2-3 in., branches spreading lax-fid., spikelets green or purple. Agrostis ciliata, 3, Nees in Herb. Royle. A. Hookeriana, Munro in Herb. Kew (non Steud.) A. Neesii, Steud. L. c. 293. A. nervosa, var. aristata, Munro in Herb. Hook, f. § T. & Herb. Falconer. A. Royleana, Duthie Grass. N.W. Ind. 30 (non Trin.). A. Wallichiana, Steud. Syn. Gram. 174. Lachnagrostis ciliata, Munro in Herb. Jacquem. n. 215. L. Hookeriana, Munro mss. Arundinella Hookeriana, W. § A. ex Arn. in Herb. Kew (Ceylon).—Agrostis If all. Cat. n. 3775.—Agrostis n. 5, Herb. Strachey

& Winterb .- A common form.

Var. scabra; stem 2-4 ft. stout, leaves 6-12 by  $\frac{1}{4}$ - $\frac{1}{2}$  in., panicle very large effuse with long spreading horizontal capillary branches sometimes 4-5 in. long in distant whorls or fascicles, spikelets  $\frac{1}{12}$ - $\frac{1}{2}$  in. pale green, gl. III with the truncate tip sometimes minutely 2-4-mucronulate. Agrostis bicuspidata, Hack. in Herb. Duthes n. 10,088. A. Royleana, Hack. l. c. n. 7583. Lachnagrostis scabra, Nees in Herb.

Royle.—In woods at about 7-10,000 it. from Kashmir to Sikkim.

Var. alpestris; stem 6-18 in. strict, leaves narrow strict, panicle shorter narrow or broad, spikelets smaller  $\frac{1}{12} \frac{1}{10}$  in. dark purple rarely green, gls. I and II oblong-lanceolate, palea sometimes =  $\frac{1}{3}$  its gl. Agrostis nervosa, Nees in Herb. Royle; ?Trin. in Mem. Acad. Petersb. Ser. VI. vi. II. (1845) 328. A. Royleana, Nees l. c. (non Trin.). A. ciliata, β. nervosa, Nees in Herb. Royle. A. Roylei, Trin. em Hack. in Herb. Duthie n. 6229.—Kashmir to Sikkim, alt. 11-15,000 ft.—A common grass at high elevations.

Var. ciliata; panicle narrow effuse, rachis flexuous, spikelets  $\frac{1}{6}$  in. shortly pedicelled pale shining, palea =  $\frac{1}{4}$  its gl. Calamagnostis ciliata, Steud. Syn. Gram. 193. Agrostis ciliata, Trin. l. c. 373. Lachnagnostis ciliata, Nees ex Steud. l. c.—N.W. India, Royle. An obscure plant of which I have seen a single specimen

from Herb. Royle.

11. **C. Schmidti**, *Hook.* f; stem very slender erect, radical leaves tufted on a woody branched rootstock linear-lanceolate rigid narrowed into

a slender petiole, cauline filiform convolute, panicle short broad, branches few and long pedicels capillary, spikelets few  $\frac{1}{8} - \frac{1}{6}$  in., gl. I and II unequal lanceolate, III truncate bicuspidate from the outer pair of nerves, awn subbasal exserted, callus hairs short, anthers linear.

NILGHIRI HILLS; Ootacamund, Schmid.

Rootstock as thick as a crow-quill. Stem filiform. Radical leaves 2-3 in., glabrous, nerves strong; petiole very slender stiff; sheaths of old basal leaves clothing the base of the new, lacerate, about an inch long; ligule long, linear, membranous. Panicle broad, rachis and few distant branches quite smooth. Spikelets pale purplish, gl. I and II membranous, 1-nerved, keels scaberulous; III hyaline, 5-nerved, hairy, awn twice as long as the spikelet; palea very minute, suborbicular.

- I have seen only one poor specimen of this curious species, which should at once be recognized by its rootstock, and the slender rigid petioles of the leaves, long ligule, and tufted lacerate old leaf-sheaths about an inch long, crowning the rootstock. There is, however, in Herb. Kew a specimen of what may be the same species collected by Clarke at Conoor (in the Nilghiris) alt. 7000 ft., with a very slender stem 2-3 ft. long, and narrow flat sessile cauline leaves with a short ligule; its spikelets quite accord with those of C. Schmidn, but the base of the stem and lower leaves are wanting.
- 12. **C. Jacquemontii**, *Hook. f.*; tall, slender, leaves very narrow, ligule oblong, panicle narrow drooping, branches erect naked below, spikelets few  $\frac{1}{6} \frac{1}{4}$  in. long-pedicelled erect, gl. I and II subequal lanceolate sub 3-nerved, III = about  $\frac{1}{2}$  II tip truncate 4-toothed, awn supra-basal exserted, palea minute, callus hairs =  $\frac{1}{2}$  gl. III, anthers long.

KASHMIR; moist places on the Pyr Panjal, Jacquemont (n. 97).

Stems apparently tufted, 18 in. high, geniculate below. Leaves 5-6 by \$ in., scaberulous; sheaths quite smooth; ligule oblong. Panicle 4-5 in., lower branches fascicled, 1-1\$ in, scaberulous. Spikelets pale yellowish; keels of gl. I and II smooth, III hairy all over—I have seen only two specimens. The long spikelets distinguish it. This approaches var. ciliata of C. pilosula, but the spikelets are considerably larger.

#### DOUBTFUL SPECIES.

C HOOKEBIANA, Steud. Syn. Gram. 292 Lachnagrostis Hookeriana, Nees ex Steud. A Ceylon plant described as having the palea as long as its gl. which occurs

in no Ceylon specimen of the genus known to me.

C. ROYLEANA, Steud. Nom. Ed. II. i. 251. C. Roylei, Steud. Syn. Gram. 193. Agrostis Royleana, Trin. in Act. Acad. Petersb. Ser. VI. vi. Sc. Nat II. (1845) 371. Lachnagrostis Royleana, Nees in Herb. Royle et Steud. Nom. l. c. L. Hookeri, Nees en Steud. Syn. l. c.—Trinius founded this species on three plants, an Indian of Royle, a Nilghiri of Zenker, and a Ceylon one from "Herb Whytt." One of his characters is the presence of a "bearded rudiment," which refers the plant to Deyeuwa. I know of no Deyeuwa in Ceylon or the Nilghiris.

# 75. DEYEUXIA, Clar.

Characters of Calamagrostis, but with the rachilla of the spikelet produced beyond gl. III and usually penicillate with silky hairs; gl. III glabrous; hairs of callus usually short.—Species enumerated about 120.

See remarks under Agrostis (p. 253). In D. Treutleri the produced portion of the lachilla is most minute and naked, in D. abnorms it is awnless and the rachilla

is very minute or absent, but the hairs of the callus are more or less crowded at the base of the palea.

- A. Rachilla bearded or penicillate.
- \* Awn of glume III basal or subbasal.
- 1. **D. sylvatica**, Kunth Revis. Gram. i. 77, Enum. Pl. i. 243, Suppl. 188, t. xiv. f. 5; tall, leaves long scabrid beneath, panicle contracted at length open, spikelets \(\frac{1}{2}\) in., gl. I and II subequal ovate-lanceolate, III rather shorter than I tip shortly lacerate, callus loosely bearded, awn about twice as long as its gl., palea rather shorter than its gl., rachilla shortly bearded. Calamagrostis sylvatica, DC. Fl. Fr. v. 253; Host Gram. Austr. iv. 28, t. 48; Trin. Gram. Unift. 223, t. 4; Reichb. Ic. Fl. Germ. t. 38; Ledeb. Fl. Ross iv. 427; Boiss. Fl. Orient. v. 526. C. arundinacea, Roth. Tent. Fl. Germ. i. 33. C. pyramidalis, Host l. c. 28, t. 49; Reichb. l. c. Arundo sylvatica, Schrad. Fl. Germ. i. 218, t. 4, f. 7. Agrostis arundinacea, Linn. Pl. Sp. 61.

WESTERN HIMALAYA; Kunawur, alt. 8000 ft., Thomson; Kashmir, alt. 10-11,000 ft., Duthie.—Distrib. Europe, Reg. Caucas.

- Stem 3-5 ft, from a creeping base. Leaves linear, 1-2 ft. by \(\frac{1}{4}\)-\(\frac{1}{2}\) in., finely acuminate; ligule short. Panicle erect or drooping, branches short, scabrid. Spikelets green or purplish; gl. I 1-nerved; II 3-nerved; awn of III shortly exserted.—I have seen only two Indian specimens, which I think belong to D. sylvatica, Kunth, one from Thomson, with a very large panicle 16 in. long has the callus hairs scanty, about \(\frac{1}{2}\) the length of the gl., the other from Duthie has a shorter panicle, a much shorter rachila, and the callus hairs are more copious and twice as long. I do not venture upon further citations than are given above, the synonymy of both Deyeuxia and Calamagrostis being in great confusion.
- 2. **D. elatior**, Hook f.; very tall, stout, leaves long, panicle 1-2 ft. pyramidal branches long spreading, spikelets  $\frac{1}{5}$  in., gl. I and II subequal lanceolate acuminate, III rather shorter than II tip truncate erose, callus laxly bearded, palea rather shorter than its gl., awn exserted, rachilla very short its hairs about half the length of the gl. or longer. Calamagnostis scabrescens, var. elatior, *Griseb. in Goett. Nachr.* (1868) 79.—Deyeuxia, No. 7, Herb. Ind. Or. Hf. & T.

KHASIA HILLS, alt. 5-5500 ft., Griffith, &c.

- Stem 5-6 ft., as thick as a swan's quill below. Leaves 2-3 ft. by  $\frac{1}{8-3}$  in., coriacceous, closely nerved, midrib prominent beneath, glabious or hairy beneath; sheaths hirsute or glabrescent; ligule short, scarious. Panicle 4-8 in. broad when expanded; branches scabrid, lower fascicled. Spikelets subscaberulous, gl. 1 and II thin, keels and upper margin of II scabrid; III membranous, callus hairs sometimes = the gl.; awn subbasal, twice as long as its gl. Grain linear-oblong.—Grisebach in reducing this to a variety of D scabrescens, has overlooked the great difference in size and habit, and the different position of the awn which is subbasal.
- 3. **D. triaristata**, Hook. f.; very slender, leaves narrow, panicle flexuous contracted, rachis and branches capillary, spikelets  $\frac{1}{4}$  in few, gl I and II subequal narrowly lanceolate, III  $\frac{1}{4}$  shorter than I truncate, two lateral nerves produced into long awns, two intermediate mucros, median awn exserted, palea  $= \frac{1}{3}$  its gl., hairs of callus  $= \frac{1}{4}$  gl. III.

SIRKIM HIMALAYA; iu woods, Yeumtong, alt. 12,000 ft., J. D. H.

Stem 12-18 in., geniculately ascending from a slender creeping base, weak.

Leaves 6-8 in., narrowly linear, finely acuminate, smooth, flaccid; ligule short

Panicle 5-6 in.; branches few, lower 2-3 in. long, and pedicels smooth

Spikelets

pale green, shining; gl. I and II quite smooth on the sides and keels; 'III hyaline, lateral awns more than half as long as the gl., dorsal awn inserted ½ above the base capillary, about twice the length of the gl., rachilla short; callus hairs scanty short.

4. **D. compacta**, Munro ex Duthie Grass. N.W. Ind. 30 (name only); stem short, leaves very narrow, panicle open or spiciform, spikelets in., gl. I and II subequal oblong-lanceolate apiculate, III truncate tip erose, palea nearly as long as its gl., awn basal, hairs of callus short. PCalamagrostis holciformis, Jaub. & Spach. Ill. Pl. Orient. iii. 61, t. 340.

WESTERN TIBET, Jacquemont; Nubra valley, alt. 14-16,000 ft., Thomson; N.

of Kumaon, alt. 15,000 ft, Strackey & Winterb. (Deyeuxia, No 1).

Stems 6-18 in., densely tufted, rather stout, sometimes slender. Leaves 1-3 in., flat or convolute; ligule short. Panele 1-2 in., branches very short, scaberulous. Panele 1-2 in., branches very short, scaberulous. Spikelets purphsh, gl. I and II membranous, nearly smooth; III  $\frac{1}{1-3}$  shorter than II, minutely scaberulous, strougly 4-nerved, callus hairs short lax.—In Jacquemont's and all other specimens in Herb Kew, the panicle is oblong spiciform, with very short branches, and not as represented in the figure cited of Galanagrosts holdiformis which is taken from a specimen collected by Jacquemont and in which the panicle is quite open. The glumes I and II are represented in the same plate as narrowly lanceolate tapering to a point, and scabrid, none of which characters agree with these specimens. Lastly, the date of collection is given as 1830, and that of the Kew specimen 1831. Nevertheless having regard to the great variability of these alpine grasses, I am disposed to think both referable to one species.

5. **D. nivicola**, Hook. f.; stem short, leaves obtuse or acute, panicle contracted spiciform, branches very short, spikelets  $\frac{1}{4}$  in. very narrow, gls. I and II unequal lanceolate smooth, III truncate tip 4-mucronate, palea nearly = the gl., awn included  $\frac{1}{7}$  rachilla half as long as the gl. shortly plumose, callus shortly bearded. Deyeuxia n. 4, Herb. Ind. Or. Hf. & T.

SIKKIM HIMALAYA; Momay, alt. 15,000 ft., J. D. H.

Stem 5-7 in., densely tufted, erect or ascending, stout. Leaves as long as the stem or shorter, flat or subconvolute,  $\frac{1}{10} - \frac{1}{2}$  in. broad; ligule short, truncate. Panicle 1-1½ in., strict, erect, green and purplish. Spikelets erect, appeared; gl. I about 2 longer than II, both 1-nerved, acuminate; III about half as long as I, hardly scaberulous, nerves 4, strong; awn basal, not twice as long as the gl., erect.

- \*\* Awn of gl. III inserted above the middle of the glume (awn 0 in D. abnormis and rachilla very minute or obsolete).
- 6. **D. scabrescens**, Munro ex Duthie in Atkins. Gaz. N.W. Ind. 628; tall, stout, leaves long, panicle long contracted, spikelets \( \frac{1}{6} \) \( \frac{1}{2} \) in., glumes all scaberulous, I and II subequal 1-nerved, III tip narrowed obtuse truncate crenulate or 2-fid, awn submedian, palea linear, callus shortly bearded. Duthie Grass. N.W. Ind. 31; Clarke in Journ. Linu. Soc. xxv. (1889) 89, t. 39. Calamagrostis scabrescens, Griseb. in Goett. Nachr (1868) 79.

TEMPERATE HIMALAYA, alt. 10-13,000 ft, from Kashmir to Bhotan. MUNNE-

PORE, alt. 9900 ft., Clarke

Stem 2-5 ft. Leaves 6-18 by  $\frac{1}{8} - \frac{1}{3}$  in., flat or convolute, scaberulous; sheath smooth; ligule membranous, lacerate. Panicle 6-10 in., erect or inclined, densefid, branches scaberulous; pedicels long or short. Spikelets green or purplish; gl. I and II linear-lanceolate, acuminate, margins smooth or villously ciliate; III scarious, tip usually 2-fid, awn inserted rather above the middle about twice as long as the gl., slightly bent, rachilla =  $\frac{1}{3} - \frac{1}{2}$  gl. III, sparingly or copiously beardad.

Grain narrowly oblong.-I do not find the awn to be twisted, as in the description

cited, and it is inserted lower than in the figure in the Linnean Journal.

 $\nabla$ ar. humilis, Griseb. l. c.; smaller, stems weaker, leaves  $\frac{1}{10} - \frac{1}{6}$  in. broad, panicle small lax-fid., spikelets green, gl. III hardly scaberulous, palea shorter. Deyeuxia No. 2, Herb. Ind. Or. Hf. & T.—Sikkim Himalaya; Lachen Valley, alt. 11-12,000 ft. J. D. H.

7. **D. filiformis**, Hook. f.; stem very slender, leaves short, panicle short, spikelets  $\frac{1}{8}$  in., gl. I and II subequal subscaberulous, II 3-nerved, III hyaline asperulous, tip truncate 4-cleft, awn capillary submedian exserted palea =  $\frac{1}{2}$  its gl., hairs of rachilla about = the gl, hairs of callus short. Calamagrostis filiformis, Griseb in Goett. Nachr. (1868) 79.

SIKKIM HIMALAYA; Lachen Valley, alt. 10-12,000 ft., J D. H.

Stem 12-18 in., terete, tufted. Leaves 2-4 in., narrow, nearly smooth; ligule membranous. Panicle 2-3 in. long and nearly as broad, pyramidal; branches few, very slender, nearly smooth. Spikelets shortly pedicelled, pale purplish, gl. I and III sometimes both 3-nerved; III strongly 4-nerved, irregularly 4-cleft at the apex, the lobes almost setaceous; awn inserted a little above the middle of the back.

8. **D. pulchella,** Hook. f.; stem short stout, panicle 1-2 in. oblong or ovate, spikelets \( \frac{1}{2} \) in. crowded dark purple, gl. I and II scaberulous finely acuminate, III scaberulous irregularly 4-toothed or sub 4-aristate, awn supra-median to sub-apical included, palea \( \frac{1}{2} - \frac{1}{2} \) as long as its gl., rachilla densely penicillate hairs = gl. III, callus shortly bearded. Calamagnostis pulchella, Griseb. in Goett Nachr. (1868) 78.

ALPINE and SUBALPINE HIMALAYA; from Kumaon and Garwhal, alt. 10-15,000

ft., to Sikkim, alt. 14-16,000 ft.—DISTRIB. Tibet. W. Szechuen, Pratt.

Stems densely tuited, strict, erect. Leaves 3-5 in., rarely more,  $\frac{1}{10}$  in broad, smooth or scaberulous, usually flat; ligule short, membranous. Panacle variable in size and form; branches minutely scabrid, sometimes elongate and spreading. Spikelets smaller than in D. scabrescens and not so strongly scaberulous, I and II rather unequal; III split at the tip into almost setiform lobes; insertion of awn most variable, but never quite terminal, capillary, as long as its gl. or shorter.—A very variable plant; the N.W. specimens have large loser more open panicles than the Sikkim. In one specimen from Garwhal, alt. 10-13,000 ft. (No 143 and 245 Duthie) the panicle is very open) and I find occasionally a gl. terminating the rachilla.

9. **D. abnormis**, Hook. f.; tall, leaves narrow flat, panicle broad or narrow, branches in distant whorls of 3-6 divided and fig. toward the ends, spikelets  $\frac{1}{12}\frac{1}{10}$  in. long-pedicelled, gls. I and II subequal oblong-lanceolate acute, III rather shorter than I tip narrowly truncate crenulate, awn 0, palea = about  $\frac{1}{2}$  its gl., rachilla very minute or obsolete, callus hairs =  $\frac{1}{4}$  the gl. Agrostis abnormis,  $Munro\ Cat.\ Pl.\ Griff.\ Helfer,\ &c.$ , 57, ined. Calamagrostis capillacea,  $Clarke\ mss.$ —Agrostis No. 11 & 12,  $Herb.\ Ind.\ Or.\ Hf.\ & T.$ 

SIKKIM HIMALAYA; Lachoong Valley, alt. 9000 ft., J D. H KHASIA HILLS, alt. 5-5500 ft., common, Grifith, &c.

Stem 6-18 in., densely tutted, erect strict and slender with a narrow panicle, or rambling with stout branching stems 3-4 ft. long and a very effuse panicle; upper internodes sometimes scaberulous. Leaves 6-8 by  $\frac{1}{6-\frac{1}{4}}$  in., rather rigid, scaberulous, as are the sheaths; ligule short, rounded. Panucle 4-6 in, rachis very slender strict; branches and branchlets capillary, quite smooth. Spikelets pale brown; gl.

I and II 1-nerved; III glabrous, nerves faint; hairs of callus longest under the palea.—Resembles Agrostis alba, from which the long callus hairs at once distinguish it.

- B. Rachilla minute, glabrous; callus hairs very short.
- 10. **D. Treutleri**, Stapf in Hook. Ic. Plant t 2396; tall, slender, panicle elongate lax-fld., spikelets  $\frac{1}{10} \frac{1}{10}$  in., gl. I and II very unequal lanceolate subacute scaberulous, III longer than II coriaceous obtuse scaberulous, palea as long as the gl., rachilla very small styliform, callus minutely hairy. Milium Treutleri, O. Kuntze Rev. Gen. Plant. 780 (partim).

SIKKIM HIMALAYA, alt. 7-12,000 ft, in woods, J. D. H., Treutler, Clarke.

Stem 2-4 ft, leafy nearly to the top Leaves 8-10 by  $\frac{1}{4} - \frac{1}{2}$  in., linear lanceolate, acuminate, flaccid, scaberulous beneath; ligule oblong. Panicle ovate, flaccid, at length rigid, scaberulous, branches in distant whorls. Spikelets narrowly ovoid, pale; gl. I ovate-lanceolate, acute, 1-nerved; II longer, subacute, 1-nerved; III longer than II, laterally compressed, keeled, palea about as long as the gl. Gram oblong, laterally compressed, tightly wrapped in the gl and palea.—A very anomalous species.

# Tribe VII. AVENEÆ. (See p. 6)

#### 76. ERIACHNE, Br.

Rigid, densely tufted grasses. Leaves filiform, convolute. Spikelets few, 2-fld (both fl. perfect), not jointed on their long pedicels; rachilla jointed at the base, not produced beyond gl. IV. Glumes 4, I and II empty, subequal, persistent, keeled, many-nerved; III and IV subequal, narrow, at length rigid, awned or not, palea rigidly coriaceous, 2-cuspidate or 2-aristate, nerves obscure. Lodicules 2, oblong, truncate. Stamens 2-3. Styles free, stigmas plumose. Grain free within the rigid gl. and palea.— Species about 22 Australian, and 2 Asiatic.

1. **E. triseta**, Nees ex Steud. Syn. Gram 237; gl. I and II linear-lanceolate, III and IV long-awned. palea long-awned. Trim. Cat. Ceyl. Pl. 108; Steud Syn. Gram. 237. Megalachne zeylanica, Thwaites Enum. Pl. Zeyl. 372, 444.

TENASSERIM; Mergui, Gruffith, Helfer. CEYLON; Colombo, Thouses Stems 1½-2 ft., slender, erect, branched below. Leaves 3-nerved; ligule very short, cihate. Pancle 2-4 in Spikelets with the awns ½-½ in. long, purple; gl. I and II subaristate, glabrous; III and IV narrow, silky; callus long

2. E. pallescens, Br. Prodr 184; gl. I and II ovate acuminate, III, IV. and palea beuspidate Kunth Enum. Pl. i. 310; Steud. Syn. Gram 237. Benth. Fl. Austral. vii. 630. E. chinensis, Hance in Ann. Sc. Nat. Ser. IV. xv. (1861) 228, in Journ. Linn Soc. xiii. (1873) 136. E. Hookeri, Munro in Journ. Linn. Soc vi. (1862) 42, name. Aira effusa, Spreng. Syst. i. 278.

CHITTAGONG, J D. H. & T.T. PAHANG, Ridley. NICOBAR ISLDS., Rurz -

DISTRIB. Borneo, Tonkin, China, Australia.

Stem 1-2 ft. Leaves glabrous or slightly hairy. Panicle very lax. Spikelets with the awns \(\frac{1}{2}\) in.; gl. I and II slightly hairy; III and IV narrow and palea villously hirsute, awns of III and IV about = the gl., of palea very short.—Bentham describes the palea as entire, but in the Indian specimens they terminate in two short rigid spines.

# 77. ZENKERIA, Trin.

Tall, perennial, long-leaved grasses. Spikelets small, panicled, 2-fld. (both fl. perfect), not jointed on their pedicels; rachilla jointed at the hairy base, not produced beyond gl. IV. Glumes 4, I and II empty, subequal or unequal, 1-nerved, keeled, acute, persistent; III and IV equal, obtuse or acuminate, many-nerved; palea as long as its gl, broad, keels strongly ciliate or hirsute. Lodicules 2, ovate, denticulate. Stamens 3. Styles short, distinct. Grain unknown.—Species the following.

1. Z. elegans, Trm in Linnea, xi. (1837) 150, t. 3; leaves long narrow, panicle thyrsiform, branches erect, gl. I and II unequal, III and IV acuminate much longer than II. Trim. Cat. Ceyl. Pl. 108. Amphidonax Heynii, Nees in Wight Cat n. 1747; Steud Syn Gram 97, Thwaites Enum. Pl Zeyl. 370. A. tenella, Wight & Arn. ex Steud. l.c.—Pappophorum? Wall Cat n. 8903.

Southern Deccan Peninsula, Heyne, &c. Burma, Kurz Ceylon, Thwaites,

Stem 2-3 ft., as thick as a crow-quill, rigid, base woody. Leaves as long as the stem or longer, strict, cornaceous, convolute, rarely flat, glabrous or sparsely hairy; sheaths cornaceous; liqule rounded. Panuele 6-8 m, rachis flexuous; branches filiform, smooth. Spikelets  $\frac{1}{10}$ - $\frac{1}{2}$  in., pedicelled, white; gl. I and II ovate, hyaline, 1-nerved; I shortest, midrib very strong, excurrent; III and IV lanceolate, sparsely villous, 7-9-nerved; IV longest and most acuminate; callus bearded with long straight hairs; palea as broad as the gls., hirsute. Anthers long, narrow.

2. Z. obtusifiora, Benth. in Journ. Linn. Soc. xix. (1881) 93; leaves broadly linear-lanceolate narrowed at both ends, panicle pyramidal, branches widely spreading, gl. I and II unequal or subequal, III and IV obtuse not longer than II. Trim. Cat. Ceyl. Pl. 108. Amphidonax obtusifiora, Thwaites Enum. Pl. Zeyl. 370.

CEYLON; at Ratnapoora, Thwartes.

Stems 3-5 ft, glabrous Leaves 2 ft. by  $\frac{3}{8}$ -1 in., acuminate, pungent, glabrous, coriaceous; ligule very short, densely hairy. Panacle 6-8 in.; branches capillary, solitary or 2-nate; pedicels longer than the spikelets, with a glandular callus at the base. Spikelets  $\frac{1}{12}$   $\frac{1}{10}$  in., as broad as long; gl. I and II ovate, apiculate by the strong excurrent nerve, glabrous; III and IV rather longer, sides and callus villous; pulea as in Z, elegans.

# 78. COELACHNE, Br.

A small leafy very variable maish grass. Leaves short, flat or convolute. Spikelets 2-fld. (both fl. perfect or upper imperfect) in open or contracted or spiciform panicles, not jointed on the pedicels, not awned; rachilla jointed at the base, produced between gl III and IV but not beyond IV. Glumes I and II broad, concave, obtuse, persistent, empty, I the largest; III much longer, subsessile, coriaceous, glabrous, except the shortly bearded callus; palea as long, coriaceous; IV much smaller and palea more or less hairy. Lodicules 0? Stamens 3; anthers long, narrow. Ovary ovoid, stigmas free. Grain free within the gl. and palea.

# G. pulchella, Br. Prodr. 187.

Nepal, Wallich, Khasia and Munnepore Hills, alt. 4-6000 ft., Bubma, Centbal and Southern India, and Ceylon.—Distrib. Trop. Asia, Australia, and Madagascar.

Stem 6-18 in., flaccid, decumbent or ascending, slender or rather stout, leafy up to the panicle. Leaves uniform throughout the stem, ½-1 in., lanceolate, subulate, acuminate, distant or subequitantly sheathing, ecostate, minutely scaberulous above, nerves striate; ligule a few hairs. Panicle very various. Spikelets ½-10 in., sessile or pedicelled, globose or ovoid; gl. I and II suborbicular or hemispheric, many-nerved, membranous or herbaceous; III hermaphrodite, coriaceous, dorsally rounded, nerves 0 or very obscure; palea coriaceous, margins incurved; IV much the smallest, often imperfect, neuter or fem.—After a long study of a multitude of specimens from all the countries mentioned above, I conclude that there is but one known species of this genus. If there are two, the second is one to include vars gracullima and perpusilla, in which case the latter name would be very inappropriate for both.

Var. pulchella proper, stems filiform decumbent and ascending, leaves lanceolate flat, paniele with distant spreading filiform bianches, spikelets  $\frac{1}{20-18}$  in. subglobose, gl I and II hemispheric, III broadly ovoid, IV family hairy or glabrous. C pulchella, Br. lc.; Endl. Iconogr. t. 2; Kunth Revis. Gram. ii. t. 143, Enum. Pl. 1. 371, Steud. Syn Gram. 284; Benth. Fl Austral. vi 626. Gramin, Wall. Cat. n. 8909—Bui ma; source of the Chappedong River, Wallich Australia.

Var. brachata, Munro in Herb. Kew, stem stout or slender suberect or ascending, panicle 2-4 in long, branches shorter than in pulchella proper, spikelets \(\frac{1}{10}\) 15 in. like those of pulchella proper but sessile. C brachata, Munro ex Benth. Fl. Austral.

vii. 626 (partun) — Tenasserim, Griffith (Kew Distrib. 6675) Helfer.

Var. sumplicauscula; stem suberect or creeping and rooting rather stout, leaves flat, panicle elongate narrow, branches short stiff, spikelets  $\frac{1}{15}$  in. ovoid sessile crowded on the branches or in fascicles on the main rachis, gl. I and II unequal, III ovate-lanceolate. C. simpliciuscula, Munro ex Benth. in Journ. Linn. Soc. xix. (1881) 93, Fl. Austral vii. 626. C. infirma, Buese Pl. Jungh i. 350; Miq. Fl. Ind. Bat. ini 399. C. pulchella, Thw. Enum. 273; Benth Fl. Hongk. 430. C. brachiata, Trim Cat. Ceyl Pl. 108. C madagascariensis, Baker, in Journ. Linn. Soc xxv. (1890) 348. Isachne brachyglumis, Hochst. in Hohen. Pl. Nilgh. n. 1283 (name). Panicum simpliciusculum, Wight & Arn. ew Steud. Syn Gram 96.—Khasia and Naga Hills, alt. 4-5000 ft. J. D. H. & T. T., Clarke Nilghiri Hills, Wight, &c. Ceylon, Walker, Thuaities (CP. 884).—Java, Tonkin, China, Madagascar.—Intermediate between brachiata and spicata.

Var. spicata; stem short stout suberect, leaves flat, spikelets  $\frac{1}{20} - \frac{1}{16}$  in. ovoid in dense spiciform panicles subsessile, gl. I and II orbicular subequal membranous, III broadly ovate.—Nepal, Wallich (Oat. n. 8908). Chota Nagpore, Clarke. S. India,

Wight (Herb n. 3376).-China.

Var. gracilima, stems 6-12 in capillary or filiform, leaves flat, panicle very slender, branches short spreading, spikelets few \(\frac{1}{6} \)\rightarrow{1}{0} in. pedicelled, gl. I and II very unequal, III and IV lanceolate. C. perpusilla, Thwo. Enum. 373 (in part).— Nilghiri Hills, Schmul. Ceylon, Adam's Peak and Newera Elia, in swamps, Thwates (C.P. 130).

Var perpusilla, stems capillary densely tufted, leaves filiform, panicles as in gracillima but with fewer branches and spikelets. C. perpusilla, Thw. l.c. in part (C.P 450). Trim.l.c. (in part). Isachne perpusilla, Wight & Arn. ew Wight Cat.

n. 2043.—Ceylon, Walker, Adam's Peak, Thwaites.

Var. Gardnere; stem 12-18 in. stout flexuous, clothed throughout with subulate-lanceolate erect sheathing leaves, panicle stiff with few short spreading branches, spikelets  $\frac{1}{12}$  in. sessile, gl. I and II subequal, III ovate.—Ceylon, Gardner (n. 1018, 1019).

# 79. TRISTACHYA, Nees.

Perennial grasses. Leaves various. Spikelets 2-fld. (lower fl. male upper fem. or perfect), panicled, not jointed on their pedicels; rachilla villous, produced between gl. II and III but not beyond IV, jointed at the base. Glumes 4; I and II unequal, not awned, persistent, empty, lanceolate,

acuminate, glabrous; III lanceolate, acuminate, membranous, awn 0; IV deeply 2-fid with a long twisted awn in the sinus (copiously bearded above the middle in the Indian sp.); palea narrow, acute. Lodicules minute, cuneate, fleshy. Anthers long. Styles long, slender. Grain narrow, free.—Species 8, chiefly tropical.

T. barbata, Nees ex Steud. Syn. Gram. 238; Boiss. Fl. Orient. v. 552; Duthie Grass. N. W. Ind. 32 T. Stocksii, Boiss l.c.; Munro in Aitchis. Cat. Panjab. Pl. 168; Duthie Fodd. Grass. N. Ind. 51. Loudetia barbata, A. Braun in Flora, xxiv. (1841) ii. 714. Sorghum barbatum, Hochst. et Steud. Pl. Arab. Exsicc. n. 788.

SCIND; Stocks .- DISTRIB. Arabia, Nubia.

Stem 6-18 in. branched and woody below, geniculately ascending, base clothed with tomentose sheaths, slender and wiry above; nodes bearded. Leaves 1-3 in, lanceolate from a rounded base, finely acuminate, pungent, rigid, glaucous, many-nerved, margin thickened subserrulate; sheaths smooth; ligule 0 Panacle sparingly branched, 1-2 in. long and broad, branches solitary and 2-nate, capillary, flexuous, subscaberulous, branchlets 1-3-fid. Spikelets ½ in., pale yellowish; gl. I and II 3-nerved, II ½-½ louger than I; III much longer than I, interruptedly 7-nerved, and its callus glabrous; IV with a very short broad lamina, margins involute, lateral lobes lanceolate, aristate, 3-nerved, rather longer than the hairs, median awn about twice as long as the gl.—I find no character for T. Stocksii.

### 80. AIRA, Linn.

Annual or perennial grasses. Leaves narrow. Spikelets 2-fld. (both fl. perfect) panicled, branches capillary; rachilla jointed at the base, not produced beyond gl. IV. Glumes 4, hyaline; I and II subequal, 3-nerved, acute, empty, persistent; III and IV smaller, often 2-toothed; awn dorsal, capillary, usually twisted below; callus naked; palea hyaline, 2-nerved. Lodicules 2 Anthers small. Grain minute, free or adhering to the hyaline gl.—Species 4 or 5, Europe and temp. Asia.

A. caryophyllea, Linn. Sp. Pl. 66; annual, very slender, leaves setaceous, ligule lanceolate, panicle broad erect capillary trichotomously branched, spikelets long-pedicelled. Kunth Enum. Pl. 1 289, Suppl. 241, t. 18, f. 2; Fl. Dan. t. 382; Lamk. Encycl. t. 44; Host Gram. Austr in 33, t. 44; Svensk. Bot. t. 508; Reichb. Ic. Fl. Germ. t. 94; Engl. Bot. t. 812; Knapp Gram Britt. t. 35; T. Nees Gen. Fl. Germ. Monocot. i. n. 44; Steud. Syn. Gram. 221, Ledeb. Fl. Ross. iv. 424; Boiss. Fl. Orient. v. 529; Duthie Grass. N.W. Ind. 31. A. canescens, Host l.c. iv. 21, t. 36. A. Cupaniana, Guss Fl. Sic. Syn. i. 145. A. curta, patulipes & plesianths, Jord. ex Bor. Fl. Centr. Fr. Ed. III. ii. 701. A. divaricata, Pourr. in Mem Acad. Toul. iii. (1788) 307. A. multiculmis, (multicaulis, Kunth), Dumort. Agrost. Tent. 121, t. 7, f. 28. A. purpureo-argentea, Gilib. Exercit. ii. 526. A. rigida, Dulac Fl. Haute-Pyren. 82. A. Todari, Tenore ex Tod. Ind. Sem. Hort Panorm. 1859; Linnea, xxx (1859) 783. A. triaristata, Clarke Trav. ii. 452. Avena caryophylla, Weber in Wigg. Prim. Fl. Hols. 10. Fussia caryophylla, Schur Enum. Pl. Transs, 754.

N.W. HIMALAYA; Kashmir. Vicary, Stewart, Kohat, and Lahul, Hay, &c Western Tiber, alt. 12,000 ft., Stolizka.—Distrib. N. Africa, temp. Asia (introd. elsewhere).

Stems 2-10 in , tufted, filiform, scabrid above Le ves obtuse and sheaths

scabrid, ligule long. Panicle 1-2 in. long and broad. Spikelets  $\frac{1}{13}$   $\frac{1}{10}$  in., ovoid, shining, gl. I and II ovate, exceeding 1I and III, keels scabrid; tips of fig. gls. 2-setose; awn twice as long as the gls., bent.

### 81. DESCHAMPSIA, Beauv.

Perennial grasses. Leaves flat or convolute. Spikelets 2- (rarely 3-) fld. (both fl. perfect) panicled, not jointed on their pedicels; rachilla jointed at the base, produced beyond gl. IV as a naked or penicillate stipes rarely bearing a male fl. Glumes 4; I and II empty, subequal, or II largest, persistent, keeled, acute, membranous, shining; III and IV subhyaline, tip toothed or lobed; awn dorsal, slender, straight or twisted; palea nariow, 2-nerved. Lodicules ovate, fleshy. Stamens 3. Styles distinct. Grain oblong, free within the gl.—Species about 20, of temp. regions.

1. D. cæspitosa, Beauv. Agrost. 91, t. 18, f. 3; stem short or tall, panicle effuse or contracted, spikelets variable in size, gl. I and II ovatelanceolate acute subequal or II rather longer, IV hardly exceeding II, awn about equalling the gl, straight not twisted. Kunth Enum Pl. i. 286, Suppl. 241; Ledeb. Fl. Ross iv. 421; T. Nees Gen. Fl. Germ. Monocot. 1. n. 43, Boiss. Fl. Orient. v. 531; Benth. Fl. Austral. vii. 587; Hook. f. Fl. Nov. Zel. i. 301; Duthie Grass. N.W. Ind. 31. Arra cæspitosa, Linn. Sp. Pl. 64; Fl. Dan. ii. t. 240; Engl. Bot. t. 1453; Knapp Gram. Britt. t. 33; Trin. Sp. Gram. Ic. t. 253, 256; Reichb Ic. Fl. Germ. t. 96. A. Kingii, Hook. f. Fl. Antarct. 376, t. 135. A. major, Syme Engl. Bot. Ed. III. xi. 63. A. micans, Jacquem. mss. Triodia splendida, Steud. Syn. Gram. 249.—Deschampsia, Wall. Cat. n. 3802; Gramin. Wall. l. c. n. 8911.

TEMPERATE and ALPINE HIMALAYA and WESTERN TIBET, in swamps from Kashmir to Bhotan, alt. 10-16,500 ft.—DISTRIB. N. and S. temp. and cold regions.

Stem 6 in. to nearly 3 feet high, stout or slender, smooth, shining, leafy upwards or in small states at the base chiefly. Leaves short or long, flat, rather softly coriaceous, quite smooth; sheaths smooth, upper very long; ligule obtuse. Panicle 4-8 in., short dense-fld. and erect, or lax-fld. effuse and inclined, sparingly branched; branches and pedicels capillary, smooth or minutely sparsely scaberulous. Spikelets \( \frac{1}{1-\frac{1}{6}} \) in., white and silvery or fulvous purplish; rachilla slender, hairy; gl. I and II concave, subacute, nerveless, or II which is broadest sub-3-nerved; III and IV truncate, erose, crenate or irregularly toothed, callus silkily hairy; awn dorsal, sub-basal.—I have not attempted to give all the synonymy of this almost cosmopolitan (in temperate regions) and very variable plant which, I think, includes fully a dozen supposed species of the N. temperate and Arctic zones. Wallich's n. 8911 "Aira coerulea, Hb. Madr." was long a puzzle to me. It is accompanied with the ticket "Aira coerulea, Blå tå tel," which latter word Dr. Stapf recognized as the Swedish for Moluma coerulea. No doubt the specimen, which is of Deschampsia caspitosa, is a Swedish one, and was introduced by accident into the Madras Herbarium.

Var. colorata, Griseb. Spicil. Fl. Rumel. ii. 457; stem short strict 4-6 in., leaves short basal, panicle small broadly ovate dense-fld., pedicels and branchlets very short, spikelets dark bronzy-yellow, sometimes 3-fld, Boss. l. c. D. Biebersteinianus, Sch. f. Mant. ii. 380. D. brevifoha, Br. in Parry Voy. App. 191. Aira brevifolia, Bieb. Fl. Taur. Cauc. iii. 63. A. triflora, Trin. in Flora, i. (1836) 433. A. Wilhelmsii, Steud. Syn. Gram. 219.—Western Tibet; Balch Pass, alt. 16,500 ft., Struch. & Winterb. Sikkim, alt. 14-16,000 ft., J. D. H.

2. D. kœlerioides, Regel in Bull. Soc. Nat. Mosc. xli. (1868) 299; stem short, leaves basal linear erect, panicle short ovoid or subspiciform, VOL. VII.

spikelets very shortly pedicelled imbricating brownish-yellow, gls. III and IV broad more or le-s 2-lobed lobes irregularly toothed.

KASHMIR and BALTISTAN, DRAS, and ISKARDO, alt. 10-14,500 ft., Clarke

Duthie .- DISTRIB. Turkestan.

Stem 6-18 in., leafy below, rather stout, strict, erect. Leaves 2-5 by  $\frac{1}{10}$  in., linear, acute, flat, nearly smooth; ligule oblong. Pancle 1-1½ in., erect Spakelets  $\frac{1}{6}$ - $\frac{1}{5}$  in.; gl. I shorter than II, sometimes 2-lobed nearly  $\frac{1}{8}$  way down with erose lobes, at others hardly lobed but unequally rather deeply toothed.—Perhaps only a form of D. caspitosa, the fig. glumes of which vary much in breadth and toothing. Regel describes the leaves of kæleriodes as narrow setaceous and scabrid above, which is totally at variance with his specimens, which are even broader than those of the Indian plant.

## 81\*. HOLCUS, Linn.

Annual or perennial tomentose grasses. Leaves usually flat. Spikelets panicled, laterally compressed, oblong, 2-fld. (both fl. bisexual, or upper male or neuter), not jointed on their pedicels; rachilla articulate at the base produced into a short stipes beyond gl. IV. Glumes 4; I and II empty, persistent, obtuse or acute, keeled, I 1-nerved; II 3-nerved; III and IV shorter than I and II, membranous; III not awned, at length hardened; IV with a slender dorsal awn; palea narrow, 2-keeled. Lodicules 2, cuneiform. Stamens 3. Styles very short, distinct. Grain oblong, free within the hardened gl.—Species about 8, European and African.

H. LANATUS, Linn. Sp. Pl. 1047; perennial, softly tomentose, panicle spreading pale green, spikelets & in, awn of gl. IV hardly exserted. Fl. Dan. t. 1181; Host Gram. Austr. i. p. 275, t. 2; Engl. Bot. t. 1169; Knapp Gram. Britt. t. 17; Kunth Enum. Pl. i. 34, Suppl. 24, t. 9, f. 2; Ledeb. Fl. Ross. iv. 410; Reichb. Ic. Fl. Germ. t. 105; Boiss. Fl. Orient. v. 532.

SIKKIM HIMALAYA; Darjeeling, alt. 7000 ft., Clarke, apparently naturalized .-

DISTRIB. Europe, temp. Asia.

Stems 1-3 ft, densely tufted, roots fibrous, nodes villous. Leaves 6-10 in.; upper sheaths inflated; ligule short, oblong Panicle 2-5 in., branches 2-3-nate. Spilalets pale green or reddish; gl. I and II acute or apiculate, strongly-nerved; II often retuse and mucronulate; III smooth and shining in fruit.—H. mollis, L., an almost equally common European grass, may be expected to be introduced into the hills of India; it closely resembles H. lanatus, but has a creeping rootstock and the awn of gl. IV is longer and exserted.

# 82. AVENA, Linn.

# (Including Trisetum, Beauv.)

Annual or perennial grasses. Leaves usually flat. Spikelets 2- or more-fld, in effuse contracted or spiciform panicles, not jointed on their pedicels; rachilla jointed at the base and sometimes between the flg. glumes. Glumes dorsally rounded, I and II empty, subequal or unequal, thin, persistent, few- or many-nerved; fl. gls. ovate or lanceolate, entire 2-toothed or -cleft, lobes awned or not, 3-7-nerved, lateral nerves sometimes obsolete; awn dorsal below the cleft, usually long and geniculate or reflexed with a twisted base, rarely straight; palea narrow, keels scabrid or ciliate. Lodicules usually 2-fid. Ovary glabrous or top villous; styles short, free. Grain various, free or (in some sp. with villous top) adherent to the palea.—Species many, chiefly N. temperate.

Having regard to the Indian species of Avena and Trisetum, I find it impossible to separate them by characters of the fl gls., there being all transitions in A. aspera from the entire gl. of Avena to the 2-aristate lateral lobes of Trisetum. There are two distinct types of ovary in both genera, the perfectly glabrous, and that with a broad hirsute or villous crown, characters which may suggest a better means of breaking up Avena. The following arrangement is provisional only. It is difficult to diagnose Avena from Bromus & Koelevia (u.c.).

Sect. I. EUAVENA. Annual. Spikelets pendulous; gl. I and II 5-7-nerved, lobes of fl. gls. awned or not; awn cylindric, column 2-grooved, conoidally twisted. Ovary with a villous top.—The determinations of the species of this section are by Dr. Stapf.

\* Flowering glumes glabrous or hairy at the base only, rachilla tenacious or tardily disarticulating at the base.

A. SATIVA, Linn. Sp. Pl. 79.

Cult. in Northern India, from Bengal to the Indus; and in the Himalaya up to 12.000 ft.

There are few specimens of the common oat in Indian collections. These represent two varieties.

Var. sericea; branches of panicle spreading equally all round, spikelets 2-fid., both fl. perfect, gls. III and IV silkily hairy at the base, rachilla silkily villous.—Bhotan, Griffith. Sikkim Himalaya, cult. at Yeumtong, alt. 12,000 ft., J. D. H. Beluchistan and Affghanistan; wild in cult. fields in the Kurrum Valley, Aitchison (n. 24).

Var. orientalis; branches of panicle more or less secund, spikelets 2-3-fid. the lower only perfect, gl. III with stiff hairs at the base, IV and rachilla glabrous. A. orientalis, Schreb. Spicil. Fl. Lips. 52; Host Gram. Austr. iii. 31, t. 44; Kunth Enum. Pl. i. 302, Suppl. 255; Boiss. Fl. Orient. v. 541. A. sterilis, Royle Illustr. Himal. Bot. 417.—N.W. India, Royle. Soane Valley, J. D. H. Murshidabad, Clarke.

- \*\* Flowering glumes hairy to and beyond the middle; rachilla freely disarticulating at the base, more tardily above it; gl. III and IV firm, shortly 2-fid., scaberulous.
- 1. A. fatua, Linn. Sp Pl 80; panicle branches equally spreading all round, gls. I and II subequal 9-nerved, III and IV firm scaberulous shortly 2-fid. clothed below with long fulvous hairs. Host Gram. Austr. ii. 42, t. 58; Fl. Dan. t. 1629; Engl. Bot. t. 2221; Knapp Gram. Britt. t. 93; Kunth Enum. Pl. i. 302, Suppl. 256; Reichb. Ic. Fl. Germ t. 103; Steud. Syn. Gram. 230; Ledeb. Fl. Ross. iv. 412; Boiss. Fl. Orient. v. 543; Royle Ill. Himal. Bot. 416; Duthie Grass. N.W. Ind. 31, Rodd. Grass. N. Ind. 51. A. byzantina, C. Koch in Linnæa, xxi. (1848) 392 A. sterilis, Del. ex Boiss. l. c; Duthie l. c. 32 (non Linn.)? A. pilosa, M.B. Griseb. in Goett. Nachr. (1868) 78.

The Panjab, N.W. Himalaya, and Western Tibet, in cult. fields, ascending to 9000 ft Sikkim Himalaya, alt. 9000 ft., Gammie.—Distrib. Temp. Europe, N. Africa, and N. Asia.

Stem 1-3 ft, stout, nodes hairy. Leaves flat, scaberulous; sheaths smooth; ligule short, torn. Panicle 6-10 in.; branches and pedicels scabrid. Spikelets about 1 in.; rachilla hairy. Callus of gl. III short, obtuse, setulose; awn stout, longer than the gls.

2. A. barbata, Brot. Fl. Lusitan. i. 108; softly tomentose, panicle

subsecund, spikelets 2-fld., gls. I and II 9-nerved, III and IV thin not scaberulous 2-fid with awned lobes densely hirsute below the middle. Ledeb. Fl. Ross. iv. 413; Boiss. Fl. Orient. v. 543; Griseb. in Goett. Nachr. (1868) 78. A. athenanthera, Presl Gram. & Cyp. Sic. 30. A. hirsuta, Roth. Catalect. Bot. iii. 19; Kunth Enum. Pl. i. 302; Webb. Phyt. Canar. iii. 400, t. 247; Steud. Syn. Gram. 230; Royle Ill. Himal. Pl. 417. A. hirtula, Lag. Gen. & Sp. Nov. 50; Kunth l. c. & Suppl. 256

WESTERN HIMALAYA; Kumaon, Thomson.—Distrib. Mediterranean region, W. and N. Asia.

Habit of A. fatua, from which its hairy leaves, &c. distinguish it.—These Avenaceous weeds of cultivation have not been much collected in India, where the above and others no doubt abound.

Sect. II. Annual, dwarf. Spikelets erect, gl. I 1-nerved, II 3-nerved, top of fl. gl. 2-aristate. Ovary glabrous, narrow.

3. A. Cavanillesii, Koch Syn. Fl. Germ Ed I. i. 797, leaves flat or convolute, panicle spiciform, spikelets 2-fld. A. Loeffingiana, Cav. Ic. 1. t. 45, f. 1; Gaud. Agrost. Helvet. i. 327; Balb. Misc. Bot. 1. 12 (non Linn). A. valesiaca, Nym. Syll. Fl. Europ 414 Trisetum Cavanillesii, Trin. in Mem. Acad. Petersb Ser. VI. i. (1831) 63 (excl. Syn. Cav); Kunth Enum. Pl. i. 297; Steud. Syn. Gram. 225. T. Gaudinianum, Boiss. Voy. Esp. 653, Fl Orient. v. 535; Parlat. Fl. Ital. i. 259. T. Loeffingianum, Beauv. ex Duthie Grass. N.W. Ind. 31. T. valesiacum, Boiss. ex Nym. Conspect. 814.

BRITISH BELUCHISTAN; at Killa Abdulla, Duthre. PESHAWUR, Stewart (ex

Duthie) .- DISTRIB. Westward to Spain.

Stems 4-6 in., densely tufted. Leaves \(\frac{1}{2}\)-1 in., linear, obtuse, sparsely hairy, rather thick; ligule oblong, hyaline. Pamcle 1-2 in., oblong; branches and pedicels very short, smooth. Spikelets \(\frac{1}{2}\) in., shining, green with purplish awns, 2-fld. and with a third imperfect; rachilla densely villous, hairs longer than the gl.; gl. I and II very unequal, keels smooth; I lanceolate; II oblong, acute; III much shorter than II, lanceolate, hyaline above and 2-nerved, the nerves ending in lateral awns as long as the gl.; callus bearded; dorsal awn nearly twice as long as the gl.; palea narrowly linear, nerveless.

Sect. III. Perennial. Spikelets erect. Fl. gls. 5-9-nerved. Ovary hirsute.

4. A. pratensis, Linn Sp Pl. 80; panicle contracted, spikelets 5-7-fld., gl. I and II 3-nerved, flg. gls entire rounded notched or erose at the tip. Fl. Dan. t. 1083, Host Fl. Austr. ii. 38, t. 51; Engl. Bot. t. 1204; Knapp Gram. Britt. t. 91; Reichb. Ic. Fl. Germ. i. t. 99; Kunth Enum Pl. 1. 300, Suppl. 254; Steud. Syn. Gram. 231; Ledeb Fl. Ross. iv. 414; Boiss. Fl. Orient. v. 546; Duthie Grass. N.W. Ind. 31. A. alpina, Sm. in Trans. Linn. Soc. x. (1811) 335; Kunth l. c. 301; Griseb. in Goett. Nachr. (1868) 78. A. argæa, Boiss. l. c. A. bromoides, Mert & Koch in Roehl Fl. Deutschl. Ed. III. i. 570. A. secunda, Jacquem. mss. (non Salisb.). Heuffelia præusta & pratensis, Schur Enum. Pl. Transs. 780. H. australis, Fourn. in Ann. Soc. Linn. Lyon, N.S. xvii. (1869) 183.

WESTERN HIMALAYA; from Kashmir to Garwhal, alt. 9-15,000 ft.—DISTRIB. Europe, Asia Minor.

Stems 10-18 in., densely tufted, rather stout, strict, leafy below. Leaves 6-10 by \$\frac{1}{3-\frac{1}{6}}\$ in., erect, coriaceous, scaberulous above, margins thickened; sheath nearly smooth; ligule oblong, lacerate. Pancle 3-4 in., erect or inclined; branches short, erect, and pedicels scaberulous. Spikelets \$\frac{1}{3-\frac{1}{6}}\$ in., narrow, glistening, green or

coppery-brown; rachilla penicillate; gl. I and II scarious, nerves scaberulous; I linear-oblong; II oblong-lanceolate; fl. gls. oblong, scarious above the middle, strongly 7-9-nerved, tip and margins broudly hyaline, margins and nerves scaberulous; awn median-doisal, twice as long as the gl., bent just above the top of the gl.; keels of palea smooth.—Hackel (in litt.) refers the Kashmir plant to A. argaea, Boiss., which the latter author distinguishes from A. pratensis by the short leaves, very short branches of the short few-fld. panicle, and golden-brown spikelets, characters all of which may be traced in Kashmir and European A. pratensis.

5. A. aspera, Munro ex Thw. Enum. Pl. Zeyl. 372; tall, slender, panicle elongate contracted flexuous inclined or nodding, branches suberect naked below, spikelets 3-4-fld. scattered, gl. I and II very unequal scarious, I 1-3-nerved, II 5-nerved, fl. gls. coriaceous smooth or scabrid 5-7- (rarely 3-) nerved tip entire erose 2-fld or 2-aristate, keels of palea closely pectinately cliate. Trimen Cat. Ceyl. Pl. 109; Griseb. in Goett. Nachr. (1868) 78.

SIKKIM HIMALAYA, alt. 9-10,000 ft., J.D. H., Clarke. KHASIA HILLS, alt. 5-6000 ft., Griffith, &c. Nilghiei Hills, Schmid, Maswell. Cevlon, alt. 6000 ft., Thwaites.

Stem 2-5 ft, slender or rather stout, erect or inclined, glabrous, or nodes slightly pubescent. Leaves 6-12 in. or more, flat or convolute, rarely \( \frac{1}{2} \) in. diam.; sheaths smooth, glabrous or pubescent; ligule short, truncate, membranous. Panele 8-16 in., usually nodding, rachis and branches smooth or faintly scabrid; lower branches 1-6 in., solitary geminate or fascicled. Spikelets \( \frac{1}{2} - \frac{1}{2} \) in. long, glistening, green, oblong; rachilla penicillate, slender; gl I narrowly lanceolate, acuminate; II \( \frac{1}{2} \) longer, oblong-lanceolate, rather shorter than III; fi gls. ovate-lanceolate, glabrous, from entire to 2-dentate or cleft nearly \( \frac{1}{2} \) way down; callus bearded; awn dorsal rather above the middle but below the cleft of the gl, and twice to thrice its length, slender, column twisted then bent and more or less recurved; keels of palea with long close-set fine cilia. Lodicules narrow, cleft. Anthers linear. Ovary obovoid or pyriform, top densely hirsute.—A very variable plant. Some of the Khasian specimens have stems 5 ft. high, and as thick as a goose-quill below, others are much smaller and very slender. The fl. gl. are most scabrid in Ceylon and Peninsular specimens, least so in Sikkim ones which pass into var. Roylei. The nearest European species is A. Besserr, Gmel. (A. sempervirens, Bess. non Vill.) of Hungary, a rigid species with narrower scabrid leaves, usually longer spikelets and obtuse erose fig. glumes.

A. ASPERA, PROPER; leaf sheaths smooth, panicle glabrous, fl. gl. more or less scaberulous entire 2-dentate or 2-fld., lobes not awned.—Sikkım, the Khasia and

Nilghiri Hills and Cevlon.

Var. Royles, Hook. f.; leaf-sheaths glabrous or softly pubescent, panicle glabrous or puberulous, fl. gls. quite smooth tip entire 2-toothed or 2-fld almost to the awn into acummate or long-awned lobes, or tip split into 3-4 short unequal bristles. A. aspera, Griseb. l. c. A. pubescens, Royle Ill. Himal. Pl. 417; Duthie l. c. 32. Trisetum virescens, Nees ex Steud. Sen. Gram. 226; Duthie Grass. N.W. Ind. 31 (non Regel).—Avena, Wall. Cat. n. 3793.—Kashmir to Nepal, alt. 6-12,000 ft. A very common grass, often 4-5 ft. high with leaves half an inch broad.

Var. parvyfora, Hook. f.; sheaths villously pubescent, branches of panicle short scabrid, spikelets crowded shortly pedicelled ‡ in long, gl. II 3-nerved, fl. gls. 2-

dentate smooth.—Sikkim, on Singalela, alt. 11,000 ft., Clarke.

Var. ? Schmedni, Hook. f.; stem slender, leaves chiefly radical, sheaths softly hairy, panicle very contracted, rachis short branches and very short pedicels puberulous or scaberulous, spikelets \(\frac{1}{2}\) in. 2-3-fld., flg. gls. very scabrid 5-nerved tile-aristate, keels of pales shortly ciliate.—Nilghiri Hills, Schmid; Ootacamund, alt. 7500-8000 ft., Clarks.—Possibly a distinct species. One specimen has 7-nerved fl. gls.

6. A. polyneura, Hook f.; panicle pyramidal, branches long few-fld.

lower horizontally spreading, spikelets 4 in. long, glumes opaque all with very strong close-set raised nerves, I 1-3-nerved, II 5-nerved, fl. gls. ovate-lanceolate tip 2-dentate 7-9-nerved, keels of palea pectinately ciliate.

NILGHIRI HILLS; Dodabetta, alt. 8000 ft., Gamble.

Stem 2-3 ft., rather stout, strict. Leaves strict, narrow, convolute; sheaths deeply grooved, lower sparsely hairy; ligule very short, truncate. Panacle 8 in., and nearly as broad; branches 2-3-nate, smooth. Spikelets reddish-brown.— Possibly only a state of aspera, as more specimens may prove; but of a very different habit and conspicuous for the large spikelets and opaque ribbed glumes.

Sect. IV. Perennials. Spikelets erect. Fl. gls. 3-5-nerved. Ovary quite glabrous.

7. A. subspicata, Clairv. Man. Herb. 17; pubescent or tomentose, ligule oblong, panicle spiciform or ovoid strict erect dense-fid. rarely effuse, spikelets \( \frac{1}{2} \), in. 2-3-fid. ovoid-oblong very shortly pedicelled, gl. I and II subequal or II longest, fl. gls. ovate or ovate-lanceelate 2-cuspidate or shortly 2-aristate 1- or faintly 3-nerved, awn reflexed rather longer than the gl. Svensk Bot t. 722; Reichb. Ic. Fl. Germ. i. t. 98; Griseb. in Goett. Nachr. (1868) 78; Ledeb. Fl. Ross. iv. 418. A. alroides, Koel. Gram. Gall. & Germ. 208. A. mollis, Mich. Fl. Am. Bor. 1. 72. A. phleoides, Urv. in Mem. Linn. Soc. Par. iv. (1826) 601. A. toluccensis, H. B & K Nov. Gen. & Sp. i. 148. Trisetum airoides, Roem. & Sch. Syst. ii. 666. T. andinum, Benth. Pl. Hartw. 261, Steud. I c. 228. T. antarcticum, Trin. in Mem. Acad. Petersb. Ser VI. i. (1831) 61 (non Nees). T. grænlandicum & labradoricum, Steud. Syn. Gram. 228. T. molle, Kunth Rev Gram. 1 101, Enum. Pl. i. 296; Torrey Fl. N. York, ii. 452, t. 154; Steud. l.c. T. phleoides, Kunth l l. c. 101, 295 (non Trin.). T. spiciforme, Dulac Fl. Haut. Pyren. 86. T. subspicatum, Beauv. Agrost. 88; Kunth Enum. i. 295, Suppl. 248; Duthie Grass. N. W. Ind. 31; Hook. Fl. Bor. Am. ii. 244; Hook. f. Fl. Antarct. i. 97, ii. 396, Handb. N. Zeal. Fl. 335; Benth. Fl. Austral. vii. 588, Steud l. c. 225. T. toluccense, Kunth Revis. l. c. 297, t. 60, Enum. l. c. 296; Steud. l. c. Aira spicata, Linn. Sp. Pl. Ed II. 95 (non Ed I.), Fl. Dan. t. 228 Aira subspicata, Linn. Syst. Ed. X. 873; Host Gram. Austr. ii. 33, t. 45; Wulf. in Jacq. Collect 111. t. 19, f. 3. Koeleria aristata, Loisel. Fl. Gall. Ed. II. 1. 66. K. spicata, Willk & Lange Prodr. Fl. Hisp. i. 72. K. subspicata, Mart. ex Reichb. Fl. Germ. Excurs. 49.

ALPINE and Subalpine Himalaya and Tiber, alt. 10-18,000 ft. (18,500 ft. in

Kunawur, Jacquemont) - DISTRIB. Alpine, Arctic, and Antarctic regions.

Stems densely tufted, 6-24 in, strict, stout or slender, always pubescent or tomentose. Leaves flat, soft, hairy, rarely glabrate, lower sheaths loose. Panicle 2-4 in., from shortly oblong to cylindric, rarely interrupted or lobed with a few very short spreading lower branches. Spikelets yellowish-green, purplish, or white, densely imbricating; rachilla short, hairy; gl. I and II more or less unequal, nearly as long as III, keels scaberulous; I 1-nerved; II 3-nerved; fl. gls. glabrous or puberulous, tip sometimes almost entire; callus bearded; awn inserted \$\frac{1}{2}\$ way below the tip, column slightly twisted but sometimes awn shorter than the gl. and straight; keels of palea scabrid. Lodicules oblong, 2-fid. Anthers short. Ovary fusiform, glabrous. Grain fusiform, compressed.

8. A. Clarkei, Hook. f.; stem very slender and branches of panicle pubescent or tomentose, ligule very short, panicle slender spiciform interrupted, spikelets narrow \( \frac{1}{6} - \frac{1}{4} \) in. 2-3-fld. glabrous sessile or shortly pedicelled, gl. I and II unequal, fl. gls. narrowly lanceolate acuminate tip

2-aristulate 1- or sub 3-nerved, awn longer than the gl. recurved or reflexed column not twisted.

KASHMIR; at Laki and Budrawur, alt 10-11,000 ft. CHAMBA; Dalhousie, alt.

8700 ft., Clarke.

- Stem 1-2 ft. Leaves 4-8 in., flaccid, softly hairy on both surfaces; sheath with spreading or reflexed soft heirs. Panicle 3-5 in., erect or inclined, rachis slender; lower branches solitary or fuscicled, rarely 1 in. long. Spikelets erect, pale brown, shining, rachilla penicillate with very long hairs; gls. hyaline as in A. subspicata, but longer and narrower.—Very near A. subspicata, but much more slender, with a longer loose panicle of shining much narrower spikelets, with obsolete side nerves.
- 9. A. micans, Hook. f.; stem and rachis of panicle pubescent or tomentose, leaves glabrous, ligule short lacerate, panicle contracted elongate ovoid or linear interrupted dense fld., branches short flowering to the base, spikelets \(\frac{1}{6}\) in densely imbricate silvery hyaline 3-5-fld. quite glabrous, gl. I and II very unequal 3-nerved, fl. gls. lanceolate obscurely 5-nerved, tip acuminate shortly 2-aristate, awn inserted \(\frac{1}{6}\) way from the tip very slender as long as the gl. column not twisted.

WESTERN HIMALAYA; Garwhal, banks of the Ganges, alt. 8-10,000 ft., Duthie. Stems 12-18 in., densely tufted, rather stout, leafy. Leaves 6-12 in. flat, narrow, rigid, finely acuminate strongly nerved, smooth or scaberulous; sheath quite smooth ingule reniform, membranous. Pancle 3-4 in. by \(\frac{1}{2}\)-1\(\frac{1}{2}\) broad, erect or inclined, strict or subflexuous; lower branches solitary, densely flowering to the base Spikelets very pale greenish yellow; rachilla slender, ciliate; gl. I lanceolate. II \(\frac{1}{3}\) longer than I oblong-lanceolate, keels of both scaberulous; fl. gls. with bearded call; awn straight or recurved; keels of palea minutely scabrid Lodicules narrow, cleft. Anthers linear. Ovary obovoid, quite smooth, style bases close together.—Quite unlike any other Indian species, but very near A. virescens, Regel of Turkestan which has flaccid leaves and an entire tip of fl. gls.

10. A. flavescens, Linn. Sp. Pl. 80; tall, slender, quite glabrous, ligule long, panicle effuse flexuous inclined or nodding branches capillary few-fld. naked below, spikelets \(\frac{1}{3}\) in 2-3-fld brown shining rachilla slender, gls. spreading, I and II unequal hyaline narrow I 1-nerved, II 3-nerved, fl. gls. narrowly lanceolate 3-nerved tip acuminate 2-aristate, awn stout inserted \(\frac{1}{4-\frac{1}{3}}\) way below the tip, twice as long as the gl. base twisted. Fl. Dan. t. 1507; Host Gram. Austr. iii. 27, t. 38; Engl. Bot. t. 952; Knapp Gram. Britt. t. 89; Reichb. Ic. Fl. Germ. t. 99; Ledeb. Fl. Ross. IV. 417; Griseb. in Goett. Nachr. (1868) 78. Trisett m flavescens, Beauv Agrost. 88; Kunth Enum. Pl. i. 298, Suppl. 252, t. 19, f. 2; Boiss. Fl. Orient. v. 537.

TEMPERATE HIMALAYA; Sikkim, alt. 12-13,000 ft., J D. H.-DISTRIB. Europe N. Asia, Japan, N. Africa.

Stem 2-3 ft. Leaves 6-18 in., flat, finely acuminate, more or less hairy; sheaths smooth; ligule elongate, membranous, lacerate. Panicle 3-5 in., quite glabrous, lower branches solitary or 2-nate. Spikelets larger than in most other species of this section, the awn longer; rachilla nodose below the fl. gls., penicillate with long hairs; gls. I and II lanceolate, acuminate; fl. gls. chartaceous with hyaline margins and tips, keels scaberulous as are the keels of the palea. Lodicules short, 2-lobed. Anthers small. Grain narrow.

11. A. aenea, Hook. f: stem glabrous, ligule short rounded, panicle spiciform dense-fid. oblong or linear simple or lobed, branches very short, spikelets  $\frac{1}{4}$  in. 2-3-fid. densely imbricating sessile or very shortly pedicelled dark or pale brown shining, glumes hyaline I 1-nerved, II 1-3-

neived, fl. gls. ovate faintly 5-nerved tip acuminate 2-aristate, awn twice as long as the gl. or less reflexed, column twisted. Trisetum aureum, Nees ex Steud. Syn. Gram. 225 (non Tenore); Duthie Grass. N.W. Ind. 3. T. aeneum, Hack. mss.

WESTERN HIMALAYA, alt. 11-12,000 ft., from Kashmir to Kumaon.

Stem erect, 1-2 ft., stout or slender. Leaves 6-10 by  $\frac{1}{3}$   $\frac{1}{4}$  in., glabrous or hairy, as are the sheaths. Panicle 3-4 by  $\frac{1}{2}$ -1 in. diam., erect, strict, or very narrow looser-fid. and flexuous; rachis branches and pedicels quite glabrous. Spikelets erect; rachilla penicillate; glumes not widely spreading, all acuminate; I lanceolate; II  $\frac{1}{2}$  longer, oblong-lanceolate; fl. gls. rather longer than II, keel scaberulous as are the keels of the palea. Grain fusiform, compressed.

12. **A. sikkimensis**, *Hook. f.*; tall, slender, stem and panicle quite glabrous, ligule short rounded, panicle narrow elongate effuse nodding flexuous, branches few-fid capillary, spikelets  $\frac{1}{4}$ - $\frac{1}{3}$  in 3-4-fid. sessile or shortly pedicelled pale or brown, rachilla not long, gls. I and II unequal acute hyaline glistening, fi. gls. coriaceous ovate 2-aristate, 1-3 nerved, chartaceous smooth, awn inserted  $\frac{1}{4}$ - $\frac{1}{3}$  way below the tip as long or nearly twice as long as the gl. reflexed column twisted.

SIRKIM HIMALAYA; Lachen and Lachoong Valleys, alt. 10-11,000 ft, J. D. H. Stem 2-3 ft. Leaves 6-12, by \$\frac{1}{6-1}\$ in, more or less hairy, flat, flaccid; sheaths glabrous except near the mouth. Panicle 6-10 in.; branches subsecund, fascicled, \$\frac{1}{2}-1\$ in. long, naked below. Spikelets usually 4-fld., sometimes nearly as brown as in A flavescens.

13. **A. flaccida**, *Hack. mss.*; very slender, quite glabrous, panicle small open, branches few capillary spreading, spikelets few pedicelled 3-fld. ½ in. long white and rose-colrd., rachilla long slender scaberulous, gls. I and II very unequal subulate-lanceolate, I and II 3-nerved, fl. gls. ovate-lanceolate acute 5-nerved, awn inserted a little below the tip as long as the gl. straight column not twisted.

The PANJAB; Black Mts., alt. 8-9000 ft, Duthie (n. 7609 in part).

A foot high. Leaves 4-6 by \$\frac{1}{6}\$ \cdot 1, \text{q}\$ in., quite glabrous; ligule short, rounded. Panicle 3 in. long, branches rather distant. Spikelets erect; gl. I much shorter and narrower than II; fl. gls. smooth, glabrous, chartaceous, white in the lower half pale rose in the upper, margins and tip hyaline, nerves very slender; awn very delicate; keels of narrow palea smooth. Lodicules lanceolate. Ovary pyriform, quite smooth, style bases rather distant.—Described from a single insufficient specimen.

#### DOUBTFUL SPECIES.

A. BENGHALENSIS, Schwaegr. Breit. ex Steud. Nom. Ed. I. 94. I have no clue to this plant, which is not taken up in Ed. II of Steudel's Nomenclator.

A. PILOSA, M. Bieb. Fl. Taur. Cauc. iii. 84; Graseb. in Goett. Nachr. (1868) 78 Tibet, Schlagintweit.—I have seen no Tibetan specimen of this, for which Griesbach is the authority

# 83. DANTHONIA, DC.

Annual or perennial grasses. Spikelets 2- or more fid. (fis. all perfect or the uppermost male) panicled, erect, not jointed on their pedicels; rachilla hairy and jointed at the base and between the fl. gls., produced beyond

the uppermost gl. Glumes 5 or more, I and II empty, subequal, as long as the whole spikelet, persistent, keeled, acute or acuminate; flg. gls. dorsally rounded, ciliate, 7-9-nerved, 2-fid, lobes acute at the base or awned and with a rigid twisted awn in the sinus; palea broad. Lodicules 2, fleshy. Stamens 3. Styles free. Grain free within the membranous or hardened gl. and palea.—Species about 100 enumerated.

1. **D. himalaica**, *Hook. f.*; leaves as long as the stem wiry, panicle 3-4 in. contracted few-fld., branches and pedicels very short, spikelets few  $\frac{2}{3}$ -1 in., 5-6-fld., gls. I and II unequal 6-7-nerved, flg. gls. sparsely hairy 9-nerved, lateral awns 0.

KUNAWAR; Jaunsar, on Lokardi Peak, alt. 8-9000 ft., Duthie.

Stems 12-18 in., densely tufted, filiform. Leaves convolute, erect, quite smooth, deeply ribbed in the inner surface; sheath short, smooth; ligule \(\frac{1}{2}\) in., hyaline, lacerate. Panicle of 4-8 erect spikelets; rachis and short erect pedicels, smooth, glabrous. Gls. I and II pale brown, much longer than the fig. gls, finely acuminate, margins hyaline, I 6-7-nerved; II longest, 7-nerved; fig. gls. \(\frac{1}{3}\)-\frac{1}{2}\) in., pale green, 2-fid; awn straight, base strongly twisted; callus silkily villous; palea short, obtusely 2-lobed, keels scabrid. Lodicules clavellate. Anthers as long as the palea. Ovary ovoid, hirsute, styles short, stigmas long.

2 **D.** exilis, Hook. f.; stem and leaves filiform, panicle short contracted racemiform few-fid., branches and pedicels very short, spikelets  $\frac{1}{2}$  in. 3-5-fid., gl. I and II unequal 1-3-nerved, fl. gls. villous, lateral awns very short.

KASHMIB; Tilail and Bargil, alt. 9-11,000 ft., Clarke; Gurail, alt. 8-9000 ft., Duthre.

Stem 3-10 in, densely tufted, very slender. Leaves 3-5 in., convolute; ligule short. Panicles \( \frac{1}{2}\)-1 in., erect or cernuous, 6-10-fid., green or brownish, branches and pedicels smooth. Spikelets erect; rachilla very short between the upper gls.; gl. I and II scarious, lanceolate, acuminate, 1-nerved or obscurely 3-nerved at the base, I the shortest; flg. gls much shorter than II, oblong, coriaceous, faintly 7-nerved, cleft nearly to the middle, lateral awns as long as their gl., median twice as long erect; callus densely bearded; palea linear-lanceolate, 2-toothed, sparsely hairy; nerves strong, scabrid. Grain obovoid, smooth, glabrous.

3. D. cachemyriana, Jaub. & Sp. Illustr. Pl. Orient. iv. 46, t. 331; stems ascending from a stout woody stock, leaves very long narrow convolute, papiele contracted, spikelets  $\frac{2}{3}-\frac{3}{4}$  in., gl. I and II subequal 3-7-nerved, fig gls. sparsely hairy, lateral awns much longer than gl. II. D. kashmiriana, Duthie in Atkins. Gaz N.W. Ind. 630, Grass. N.W. Ind. 32: Griseb. in Goett. Nachr. (1868) 78.

TEMPERATE and ALPINE HIMALAYA, and W. TIBET, alt. 10-14,000 ft.

Stem 1-2 ft, densely tuited, or creeping below and clothed with shining sheaths. Leaves as long as the stem or longer, erect, flexnous, wiry, glabrous; sheaths glabrous, or lower rarely tomentose; ligule a pubescent ridge. Panicle most variable in number and disposition of the spikelets, erect, 4-5 in. long, with 30 or more close erect spikelets \(^3\) in. long, or more lax with fewer (3-4 or more) spikelets on longer or shorter rarely spreading branches and pedicels, the latter smooth hairy or scabrid. Spikelets 2-5-fld., erect, pale, rather shining; rachilla more or less hairy; gls. I and II membranous, sometimes purple, rarely very sparsely hairy, keels smooth; I rather the smallest, nerves very variable, more or less trabeculate; flg. gls. much smaller, linear-lanceolate, cleft about \(^1\) way down, 9-nerved; lateral awns as long as the gl. or longer, exserted, median strongly twisted often to

the tip, variable in length, about twice that of gl. II; callus bearded; palea as long as the gl., linear, obtuse, keels nearly smooth. Anthers linear. Grain narrowly oblong, glabrous. -A very variable plant in panicle but constant in habit. Jaubert and Spach's figure is of a very starved small form, and I have not found in Jacquemont or other specimens the whorl of hairs at the top of the pedicel (base of gl. I and II) which they represent. The nervation of gl. I and II varies remarkably. I find both 3-nerved in Sikkim specimens, both 5-nerved in many Western Himalayan; both sub 7-nerved in Kunawur ones; both 4-nerved in Simla ones; I 3-nerved, II 5-nerved in some Western; I 5-nerved, II 7-nerved in Garwhal; I 5-nerved and II sub 6-nerved in Jacquemont's n. 260, in which the awn is twisted to the tip; both are very sparsely hairy in a few specimens. The lower sheaths are villous in Simla (Hattu) specimens

Var. minor; stems 6-8 in. very slender, leaves filiform, panicle often recurved, spikelets 4-8, gl. I and II often purple 5-7-nerved. Danthonia No. 2. Herb. Strach. & Winterb .- Alpine Himalaya, from Garwhal to Sikkim, alt. 12-14,000

4. D. Cumminsii, Hook. f.; stem ascending, leaves filiform, panicle small, rachis and pedicels villous, spikelets 3-6 1 in. long very shortly pedicelled, lateral awns of gl. III very short, median not twice as long as gl. II hardly twisted.

BHOTAN; Gnatong in the Sikkim frontier, alt. 12,000 ft., Cummins.

Possibly a form of D. cachemyriana, but the characters are marked. The specimens are curved in a semi-circle, no doubt from growing amongst rocks, as was the case with Calamagrostis tripilifera, var. (p. 262).

#### DOUBTFUL SPECIES OF DANTHONIA.

D. GRIFFITHIANA, C. Muell. in Bot. Zeit. xiv. (1856) 374.-Khasia Hills, Griffith .- Judging by the description this is not a Danthonia, but I have formed no idea of what it may be.

# 84. DUTHIÆA, Hack.

No. 123 in Clavis, p. 8.

Tufted perennial erect glabrous grasses. Leaves linear, subconvolute. Spikelets 3-5-fld., often bracteate, in a short simple unilateral raceme, laterally subcompressed, not jointed on the pedicels, uppermost fl. imperfect; rachilla articulate. Gls. I and II empty, persistent, lanceolate, acuminate, 7-11-nerved, dorsally rounded; fl. gls. herbaceous, oblanceolate, 7-11-nerved, 2-fid, awned in the sinus, margins membranous, awn half-twisted; palea 2-keeled, keels scabrid, excurrent. Lodicules 0. Stamens 3. Ovary hispid, narrowed into a slender style; stigmas very long, papillose, exserted from the top of the spikelets. Grain oblong, crowned with the style, hirsute.-Species 2, Western Himalaya and Affghanistan.

D. bromoides, Hack. in Verhandl. Zool. Bot. Ges. Wien. (1895) 200; spikelets 3-5-fld., rachilla harry, gl. I and II 7-11-nerved margins narrowly hyaline, fl. gls. obtusely 2-lobed dorsally hairy below, style about as long as the stigmas. Stapf in Hook. Ic. Pl. t. 2474.

KASHMIR, alt. 12-13,000 ft., Jacquemont, Duthie. Western Tibet, alt. 12,000

ft., Thomson, Clarke. Brenda Pass, KUNAWUR (Herb. Saharunpore).

Stems 18-24 in., slender, compressed, scaberulous above. Leaves 6-12 in., rather rigid, cauline very short, flat, acute; sheaths compressed, of uppermost inflated embracing the raceme; ligule oblong. Raceme 1-2 in., inclined, rachis scabrid. Spikelets 5-6, subsessile, ovoid, about 1 in. long (without the awns) green; bracts scarious; gl. I often faintly nerved; II 7-nerved, subaristate; flg. gls. oblanceolate, hairy below the middle, lobes obtuse; awn 3-1 in., scabrid, obscurely geniculate. Ovary narrow, style 3-3 in. long.—A remarkable grass, the character and affinities of which are discussed at length by Hackel, who places it next to Bromus, where it will be found (No. 123) in the clavis of this work, p 8. The recognition by Dr. Stapf of a second species, D. oligostachya, Stapf (Avena oligostachya, Munro in Journ. Linn. Soc. xviii. (1880) 108, name only, Attchison l. c. xix. (1882) 193, t. 30) proves the position of the genus to be near Danthonia, where I had placed it, before its publication by Hackel, when I deterred to that author's high authority.

# Tribe VIII. CHLORIDEÆ. (See p. 6.)

## 84. MICROCHLOA, Br.

Slender perennial grasses. Leaves filiform, convolute. Spikelets very narrow, 1-fld, minute, 2-seriate, unilateral on a solitary terminal filiform curved spike, not jointed at the base, awnless; rachilla jointed at the base, not produced beyond gl. III. Glumes 3, I and II empty, membranous, 1-nerved, keeled, persistent; III very small, oblong, hyaline, awnless; palea as long as the gl., keels ciliate. Lodicules 2, truncate. Anthers linear. Styles distinct. Grain oblong, fusiform, glabrous, free within the hyaline gls.—Species 3, two confined to Africa and the following.

M. setacea, Br. Prodr. 208; H. B & K. Nov. Gen. & Sp. i. 84, t. 22; Beauv. Agrost. 115, t. 20, f. 8; Nees Agrost Bras 441; Fl. Afr. Austr. 247; Kunth Enum. Pl. i. 258, Suppl. 201; Doell in Mart. Fl. Bras. ii. III. 76, t. 21; Steud. Syn Gram 202; Benth. Fl Hongk. 428, Fl. Austral. vii. 608. M. elongata, Br. in Wall. Cat. n. 3807. Rottboellia setacea, Rowb. Corom. Pl. ii. 18, t. 132, Fl. Ind. i. 357. Nardus indica, Linn. f. Suppl. 105.

BENGAL, Roxburgh, on walls. Nepal, Wallich. Khasia Hills, alt. 4-6000 ft., J. D. H. & T. T., Clarke. Central Provinces; Chanda, Duthie. Nilghiei Hills, Perrottet.—Distrib. Tropics of Old and New World.

Stems tufted, 6-10 in., wiry. Leaves as long as the stem, curved, glabrous or sparsely hairy; ligule very short, ciliate. Spike 2-10 in., with the spikelets  $\frac{1}{10}-\frac{1}{6}$  in. diam.; rachis slender, dorsally rounded. Spikelets  $\frac{1}{10}$  in, close-set, alternating in two unilateral rows, erect; gls. I and II subequal, lanceolate, acute, twice as long as III, which is o btuse, harry, nerveless; palea lanceolate, 2-toothed.

# 85. GRACILEA, Koen.

Small grasses. Leaves short. Spikelets 1-2-fld. (fl. unisexual?) collected in turbinate awned deciduous spicate clusters which are secund sessile and jointed on a filiform or capillary flexuous terminal rachis; rachilla not jointed, sometimes produced beyond gl. IV and bearing an imperfect fl. Glumes 4-6; I and II narrow, rigid, ciliate with long hairs, narrowed into long rigid scabrid awns, I narrowest; II with broad hyaline margins; III and IV broadly ovate, membranous, scaberulous, 3-nerved, shortly awned, tip entire or 2-cuspidate; palea as broad as the gl., 2-cuspidate. Lodicules cuneiform. Anthers small. Grain oblong, free.—Species, 2 Indian and African.

1. G. nutans, Koen. in Ges. Naturf. Fr. Neue Schrift. iv. (1803) 218; perennial? leaves lanceolate. Melanocenchris Rothiana, News in

Proc. Linn. Soc. i. (1841) 95; Wight Cat. n. 1768; Dalz. & Gibs. Bomb. Fl. 297. M. Perrottetu, Jaub. & Sp. Ill. Pl. Or. IV. 39, t. 326. Pommereulla monoeca, Rottl. l. c.; Roth. Nov. Sp. 33 (monoica); Kunth Enum Pl. i. 321; Wall. Cat. n. 8905 excl. D.

MYSORE and the CARNATIC, Heyne, &c. CEYLON; Mannar district, Trimen.

Stems 6-8 in., stout and decumbent below, erect or geniculately ascending. Leaves \(\frac{3}{4}\)-1 in., narrowed from the subcordate base to the acute tip, rigid, margins setosely serrulate; ligule of short hairs. Spikes and clusters of spikelets as in G. Royleana, but tip of gl. III entire, IV bicuspidate.

2. G. Royleana, Hook f.; annual, leaves filiform. Melanocenchris Royleana, Nees in Proc. Linn Soc. 1. (1841) 95; Artchis. Cat. Panjab Pl. 168 (excl. Syn.); Duthie Grass. N.W. Ind. 33, Fodd. Grass. N. Ind. 54, t. 67; Lisboa in Journ Bomb. Nat. Hist. Soc. viii. (1893) 370. M. Jacquemontii, Jaub. & Sp. Ill. Pl. Or. iv. 36. Pommerculla monoica, Wall. Cat. n. 8905 D. P. Royleana, Steud. Nom. Ed. II. in. 379. Amphipogon humilis, Herb. Ham ex Wall. Cat. l. c.—Roylea, Nees ex Steud. l. c. 475.

The Panjab Plain, Hamilton, Royle, &c., eastwd. to Delbi, Clarke. Rajpootana, Central India, the Concan, Canaba, and Scind.—Distrib. Socotra, Nubia

Stems 3-8 in., densely tufted, very slender. Leaves 1-2 in., flat or convolute, glabrous or margins below and sheaths setulose; ligule a ridge of hairs. Spikes filiform, 1-2 in., flexuous, often reclined or recurved; rachis 3-gonous, smooth; clusters of spikelets \(\frac{1}{2}\)-\frac{1}{3} in. long including the awns, green or purple, awns of gl. I and II longer than the gls., of III very short.

Var. plumosa; clusters of spikelets \( \frac{1}{2} \) in. including the awns. M. plumosa, \( Jaub. \frac{3}{5} \) Sp. l. c. 37; \( Hochst \) in \( Flora \) (1855) 273, 417. \( Pennisetum \) plumosum, \( Hochst. \) ev \( Steud. \) Syn. \( Gram \) 201. \( Ptilonema \) plumosum, \( Steud. \) l c. \( Eutriana \) abyssnica, \( Br. \) ev \( Fresen. \) in \( Mus. \) Senkenb. ii. (1837) 142. \( —The \) Panjab, \( Jhelum \)

River, Astchison. Scind, Stocks Arabia, Abyssinia.

# 86. ENTEROPOGON, Nees.

Slender perennial grasses. Leaves long, very narrow. Spikelets very narrow, 1-2-fld. (lower fl. perfect upper if present male or neuter) unlateral in a solitary terminal slender spike, not jointed at the base; rachilla jointed at the base. Glumes 3 or 4; I and II unequal, narrow, hyaline, 1-nerved, persistent, III much larger, linear, rigid, scabrid, dorsally rounded, 3-nerved, tip entire, or acutely 2-fid with a short erect awn in the cleft; callus bearded; palea lanceolate, 2-toothed, keels scabrid. Lodicules 2. Anthers very long. Styles distinct. Grain narrow, free within the hardened gls.—Species, an African, and the following.

E. melicoides. Nees in Lindl. Introd. Nat. Syst. Ed. II. 449; Wall. Cat. n. 8893; Wight Cat. n. 1757; Trim. Cat. Ceyl. Pl. 109. Eutriana enteropogon, Steud. Syn. Gram. 216. Ischæmum melicoides, Koen. ex Rottl. in Ges. Naturf. Neue Fr. Schrift. iv. (1803) 211. Ctenium seychelense, Baker Fl. Maurit. 452. Festuca mysorensis, Heyne ex Roem. & Sch. Syst. ii. 600. Prottboellis triacautha, Roth. Nov. Sp. 43. R. pilosa, Roth. in Roem. & Sch. l. c. 785.

MYSOBE, Hoyne, Wight. BURMA; Shan Hills, Collett. CEYLON, Trimen.—DISTRIB. Seychelle Islds.

Stems 1-3 ft., densely tufted, wiry. Leaves nearly as long as the stem, up to  $\frac{1}{4}$  in. broad, flat or convolute, tip capillary; ligule of long hairs. Spikes 6-10 in., flexuous or curved, rachis dorsally rounded. Spikelets  $\frac{1}{6}-\frac{1}{4}$  in., loosely imbricate, rarely 2-seriate; gls. I and II glistening; III opaque, with a very thick raised midril; awn about = the gl.

#### 87. TRIPOGON, Roth.

Slender densely tufted grasses. Leaves usually convolute. Spikelets many-fid. (ft. all but 1-2 terminal perfect), 2-seriate and unlateral on a very slender terminal spike, not jointed at the base; rachilla produced between the glumes, jointed at the base. Glumes many, I and II unequal, distantly superposed, 1-nerved, empty, persistent; I usually lodged in a furrow of the rachis, and toothed or lobed on one side; II entire or notched below the mucronate or apiculate tip; III and following ovate, dorsally convex, 2-fid, and awned in the cleft, or 4-fid with the outer lobes awned, the inner membranous and rarely awned; palea broad or narrow, complicate. Lodicules 2. Stamens 3 Styles very short Grain very narrow, free.—Species about 10, trop. and subtrop. Asia and Africa.

The species of Tripogon are very closely allied, and though dissimilar in many respects, are so variable in all, that they form an almost inextricable plexus. The most distinct are T. capillatus, pauperculus, Wightin, and abyssimeus, of which the latter almost passes into Jacquemontis. Glume I is remarkable from being in most species inæquilateral, one margin being deeply notched, or dilated suddenly below the middle into a wing or lobe or segment, which is sometimes displaced and appears as a small 3rd or lowest empty glume. The subequal symmetrical glumes of T. pauperculus and Wightin are unusual in the genus.—The length of the awas, and of the lobes of the gl. III vary in each species; and there is every intermediate between the species with two simple awned lobes one on each side of the median awa, as in T. trifdus, and the quadrifid top of the gl. of T. filiformis.—The species grow promisciously on tocks or trunks of trees.

- \* Flg. glumes simply 2-fid with an interposed awn, the lobes awned or not.
  - + Awn as long or longer than its glume.
- 1. T. capillatus, Jaub. & Spach Illustr. Fl. Orient. iv. 47, t. 332; gl. I and II narrowly lanceolate acuminate or awned, III villous at the base, awn many times longer than its gl. flexuous. T. capitatus (err. typ.) Lusboa in Journ. Bomb. Nat. Hist. Soc. vii. (1893) 371.

BEHAR; on Parusnath, J. D. H, Clarke. Westebn Ghats; from the Concan to the Nilghiri Hills, Jacquemont, &c.

Stem very slender. Leaves 6-10 in., convolute. Spike 6-12 in, filiform or capillary, flexuous. Spikelets remote, 10-11 in., few-fid, green; gl. I sometimes very minute, at others nearly as long as II, both sometimes awned, membranous with a broad defined nerve; lateral teeth of III shortly awned; median awn so slender as to be barely visible.

2. **T. pauperculus**, Stapf in Hook. Ic. Pl. t. 2442; dwarf, stems capillary, gl. I and II lanceolate subaristately acuminate symmetrical, III villous at the base, lateral lobes long-awned median-awn not twice as long as the gl.

WESTERN GHATS; near Poons, on stems of trees, Woodrow.

Stems 2-3 in., densely tufted, leafy to the tip Leaves setuceous, involute, upper

much longer than the spike, acute; sheaths striate, lower lax; ligule ovate, obtuse. Spikelets 1-3, remote, 1-4-fid.; gl. I and II 1-nerved, gl. I shorter than II; fig. gls. 1-4 with 1-2 empty above them, linear-oblong, 3-nerved; lateral lobes with capillary awns; median awn twisted at the base; palea oblong, keels ciliolate. Anthers minute, subglobose. Gram narrowly linear, cylindric.

3. **T. trifidus,** Munro, ex Stapf in Kew Bulletin (1892) p. 85; spikelets  $\frac{1}{2}-\frac{1}{2}$  in., gl. I lobed on one side, II narrowly lanceolate acuminate entire or notched below the tip, III villous at the base, awn twice as long as the gl. or longer.

Sirkim Himalaya, alt. 5–6000 ft., J. D. H. Mishmi Hills, Griffith. Khasia Hills, alt. 4–5500 ft., Griffith. (Kew Distrib. n. 6633, 6634).—Distrib. Tonkin.

- Stem 8-18 in. Leaves 6-10 in Spikes 2-12 in., stout or slender. Spikelets 3, close or distant, 4-10-fld.; gl. I lanceolate, acuminate or aristate, broadly lobed on one side, the lobe sometimes detached; II much longer, lanceolate, acuminate or 2-toothed with a short awn; III and following bearded at the base; lateral lobes simple, lanceolate, and awned or irregularly toothed in the inner margins, or rarely with a small tooth at its inner base; awn usually twice or thrice as long as the glume, erect and flexuous, or recurved; palea elliptic-oblong, obtuse, keels scabrid.—In the Sikhim specimens gl. I and II are sometimes very long lanceolate aristately acuminate with the lobe of I placed lower down, in others gl. I is much shorter than II, with a broad lateral lobe towards its base; in others again gl. I is deeply notched on one side towards the tip only; gl. II is 2-toothed below the tip and has 5 contiguous strands on the thickened disk; gl. III and its palea are longer and narrower than in any Khasia form, where, however, the plant is so variable that I hesitate to regard the Sikkim one as a different species.
- 4. **T. Wightii,** Hook f., spikelets  $1-l\frac{1}{2}$  in 10-30-fid., gl. I and II subequal linear-oblong tip 2-toothed and mucronate, awn recurved as long or twice as long as its gl.

Mysore; at Bellary (1834) Wight (n. 1793?).

- Spikes 6-8 in., rachis as stout as a sparrow's quill. Spikelets 10-12, from \( \frac{1}{2} \frac{1}{2} \) in apart; gl I and II linear-oblong, membranous, hyaline, with a strong defined midrib; III rather narrow, base bearded, lateral lobes lanceolate not awned; palea oblong, keels obscurely scabrid.—A very distinct species, of which there are only spikes in Wight's Herbarium. Bellary is a botanically unexplored district.
  - †† Awn shorter than its gl.
- 5. **T. Lisboæ**, Stapf in Kew Bulletin (1892) 86; spikelets  $\frac{1}{8}$   $\frac{1}{3}$  in. 5-12-fid., gl. I lanceolate obtusely toothed on one side, II twice as long linear-oblong coriaceous apiculate, awn of III very short. Leptochloa tripogonoides, Munro mss. ex Lisboa l. c. Tripogon, n. 5, Herb. Ind. Or. H. f. & T. Tripogon sp. nov., Lisboa in Journ. Bomb. Nat. Hist. Soc. vii. (1893) 370.

RAJPUTANA; Mt. Abu, Duthie. The Concan, Canara, and Mysore, Jacquemont, &c.

Stem stout or slender, in Jacquemont's specimen 3 ft. high and as thick as a duck's quill below. Leaves 1-2 ft. by \$\frac{1}{0} - \frac{1}{2}\$ in., quite smooth, flat or convolute. Spikes 6-10 in.; rachis stout or slender, strict. Spikelets usually densely crowded; glumes coriaceous; lobes of III short membranous not awned, base very shortly bearded; awn \$\frac{1}{2}\$ the length of its gl. or shorter; palea oblong, keels scaberulous.— The difference in stoutness of stem and spike, and of size of the spikelets is remarkable.

6. T. Jacquemontii, Stapf in Kew Bulletin (1892) 85; spikelets \$\frac{1}{3}\$ in 10-20-fid., gl. I lanceolate lobed on one side, II \$\frac{1}{3}\$ longer ovate-

lanceolate coriaceous nerve broad or narrow 2-toothed below the tip, awn half as long as its gl. or shorter. Lisboa in Journ. Bomb. Nat. Hist. Soc. vii. (1893) 370. T. bengalensis, Munro mss.

Bengal; Griffith (Kew Distrib. n. 6636). Malwa, the Concan and Deccan,

Jacquemont, &c.

Stem very slender, 1-2 ft. Leaves filiform. Spikes 6-10 in., slender. Spikelets crowded or not; glumes subcoriaceous, uppermost flowerless; lobes of III ovate, acute, not awned, base shortly bearded; awn straight, variable in length; palea

oblong, keels scaberulous.

Var. submuticus; gl. I subulate-lanceolate slightly oblique towards the base very much smaller and narrower than II, awn hardly longer than the lobes of the gl. T. submutica, Hack in Herb Duthie.—Western Himalaya; below Kotgurh, Thomson. Simla, alt. 7-8000 ft., Duthie.—The habitat is far removed from that of all other species. Duthie's specimen has the excessively slender habit and all other characters of the type but those above given. Thomson's are much shorter, with shorter leaves, and are intermediate between Jacquemont's and the following.

7. **T. abyssinicus**, Nees ex Steud. Syn. Gram. 301; dwarf, very slender, spikelets  $\frac{1}{8-6}$  in. 6-8-fld., gl. I very small ovate or subulate-lanceolate unequal or lobulate-sided, II corraceous linear-oblong 2-3-toothed below the tip, III 2-toothed at the truncate tip, awn minute. T. minimus, Hochst. ex Steud. l.c. T. bromoides, Benth. in Gen. Pl. iii 1200; Duthie Grass N.W. Ind. 33 (not of Roth.). T. festucades, Clarke ex Duthie l.c. Danthonia leptophylla, A. Rich. Tent. Fl. Abyss ii. 421. Festuca filiforms, Steud. l.c. Catapodium filiforme, Nees ex Steud. l.c. C. fusiforme, Benth. in Journ. Linn. Soc. xix. (1881) 128 (error for filiforme).

WESTERN HIMALAYA; from Kashmir to Sımla, alt. 5-7000 ft., Royle, &c.

WESTERN PANJAB, Stewart, &c .- DISTRIB. Affghan, Tropical Africa.

Stem 6-10 in. Leaves 2-6 in., filiform. Spitelets always very small and usually rather distant; glumes rather thin, narrow; I membranous, nerve strong; II linear-oblong, with a narrow membranous margin, base bearded, tip sometimes erose and 2-mucronate.

- \*\* Fl. glumes 4-fid, outer lobes awned or not, inner membranous sometimes very short or truncate.
- 8. **T. bromoides,** Roth. Nov. Sp. 49; spikes long or short, spikelets  $\frac{1}{6-\frac{1}{2}}$  in. few- or many-fld., gl. I ovate or lanceolate deeply notched on one side, II oblong-lanceolate bifid with a short awn in the cleft, III with small awned outer lobes broad ovate acute, inner and median awn shorter than the gl. Wall. Cat. n. 8887; Wight Cat. n. 1793; Steud. Syn. Gram. 301; Stapf in Kew Bullet. (1891) 85. T. fertncoides, Jaub. & Spach Ill. Fl. Orient. iv. 49, t. 333. T. Griffithii, Wight & Arn. ex Wight Cat. n. 2658; Nees ex Steud. l. c. 301. T. lanatus, Hochst. ex Steud. l. c. T. Neesianus, Wight & Arn. ex Wight Cat. n. 2059. T. zeylanicus, Nees ex Wight Cat. n. 2360; Steud. l. c.; Thwaites Enum. 374; Trim. Cat. Ceyl. Pl. 109. Triathera bromoides, Roth. ex Kunth l. c. Bromus Myurus & Festuca mysurensis, Herb Heyne. Plagiolytrum calycinum, Nees in Proc. Linn. Soc i. 95; Wight Cat. n. 1793 & 2059. Avena mysorensis, Spreng. Syst. i. 337.

MALABAR GHATS; from Belgaum southward, alt. 4-7000 ft. CEYLON; in the

elevated districts.

Stems 6-18 in., stout or slender. Leaves usually short, but sometimes as long as the stem, flat or convolute, and filiform. Spike 3-8 in. Spikelets very variable, close or distant. Gls. I membranous, nerve stout; II membranous, or coriaceous

with broad membranous margins, more deeply notched or bifid at the apex than in any other species; III and following bearded at the base, broadly ovate, strongly 3-nerved, cleft hulf way down, outer lobes small placed low down and margined with their awns half as long as the gl. or longer, nuner lobes often half as long as the gl., much larger than in any other species; awn rarely as long as its gl.

Var. major, Stapf mss.; stem 2-4 ft., leaves 5-6 in. narrow flat spreading, spike 4-6 in., spikelets \( \frac{2}{3} \) in. bifarious 16-20-fld.—Nilghiri Hills, Nadavattam, alt.

6000 ft., Lawson. Pulney Hills, Wight.

Var. longifolms; stem 2 ft., leaves filiform as long as the stem, spike 3 in., spikelets \( \frac{1}{2} \) in., second 8-10 fld. -Nilghiri and Pulney Hills.

9. **T. filiformis**, Nees ex Steud Syn. Gram. 301; very slender, leaves filiform as long as the stem, spikes 3-10 in., spikelets  $\frac{1}{8}-\frac{1}{3}$  in., gl. I ovate broadly lobed on one side, II linear-oblong or lanceolate 2-toothed below the tip, III with small shortly awned outer lobes, and short or long obtuse acute or awned inner, median awn twice as long as its gl. or longer. Duthie Grass. N.W. Ind. 33 T. semitruncatus, Nees, & T. unidentatus, Nees ex Steud. l. c.; Duthie l. c. Plagiolytrum filiforme and unidentatum, Nees in Proc. Linn. S. 1. 95. Catapodium filiforme, Nees ex Duthie l. c.—Tripogon, Wall. Cat. 8888, 8889.

TEMPERATE HIMALAYA, from Dalhousie to Bhotan, alt. 5-10,000 ft. KHASIA

HILLS, alt. 5-5500 ft., Wallich, &c.

Habit of T. trifidus and only to be distinguished by the acute obtuse or awned long or short teeth or lobes between the 3 awns of gl. III, and perhaps only a form of that plant. The longer awns and minute teeth of the top of gl. II best distinguish it from T. bromoides.

VAR. tenuispica; spike very slender, rachis filiform, spikelets very small pale, awn of gl. III long and slender. Tripogon, Wall. Cat. n. 8892.—N.W. Himal., Sikkim

and the Khasia Hulls.

#### 88. CYNODON, Pers.

Perennial creeping grasses. Leaves narrow, flat. Spikelets minute, 1-fld., 1-2-seriate, unilateral on 3-6 digitate slender spikes, not jointed at the base; rachilla jointed at the base, not produced beyond gl. III or at its back only. Glumes 3, I and II empty, thin, keeled, persistent or separately deciduous; III broader, membranous, awnless; palea as long, 2-nerved. Lodicules 2, short. Anthers large. Styles distinct. Grain oblong, free within the gls.—Species 4, 3 Australian and the following.

C. dactylon, Pers. Syn. i 85, gl. I and II shorter than III, rachilla produced at the base or gl. III dorsally as a minute bristle. Kunth Enum. Pl. i. 259; Suppl. 203, t. 16, f. 1, Reichb. Ic. Fl. Germ t 26; T. Nees Gen. Fl. Germ. Minocot. 1. n. 19; Wall. Cat. n. 3803; Dalz. & Gibs. Romb. Fl. 297, Griff. Notul. 11. 50, Ic. Pl. Assat. t. 139, f. 204, Thwaites Enum. Pl. Zeyl. 371, Trim. Cat. Ceyl. Pl. 109; Astchis. Cat. Panjab. Pl. 160; Duthie Gruss. N.W. Ind. 32, Fodd. Grass. N Ind. 52; Lisboa in Journ. Bomb. Nat. Hist. Soc. vii. (1893) 366; Benth. Fl. Hongk. 428, Fl. Austral. vii. 609. C erectus, Presl Rel Hænk 1. 290, Kunth l. c. 200. C. filiformis, Voigt Hort. Suburb. Calc. 712. C. Innearis, Willd. Enum. Hort. Berol. 90; Wight Cat. n. 1750. C. maritimus, H. B & K. Nov. Gen. & Sp. 1. 170. C. occidentalis & portoricensis, Willd. ex Steud. Nom. Ed. II. 1. 463. C. radiatus, Roth. Nov. Pl. Sp. 38; Kunth. l. c. 260. C. repens, Dulac Fl. Haut. Pyren. 76. C. sarmentosus, S. F. Gray Nat. Arr. Brit. Pl. ii. 100. C. stellatus, Willd. Enum. Hort. Berol. 90; Kunth. l. c. 260. C. virgatus,

Nees ex Steud. Syn Gram. 213. Chloris Cynodon, Trin. Gram. Unif. 229. Chlor. maritima, Trin. l. c. 226. Fibichia umbellata, Koel Gram. Gall. & Germ. 308. Dactylon officinale, Vill. Hist. Pl Dauph. ii. 69. Digitaria Dactylon, Scop. Fl. Carn. Ed. II. i. 52. D. littoralis, Salisb. Prodr. 19. D. maritima & radiata, Spreng. l. c. 272. D. stolonifera, Schrud. Fl. Germ. i. 165, t. 3, f. 9. Panicum dactylon, Linn. Sp. Pl. 58; Host Gram. Austr. ii. 15, t. 18; Sibth. Fl. Græc 45, t. 60; Engl. Bot t. 840; Knapp Gram. Britt. t. 13; Grah. Cat. Bomb. Pl. 236; Roxb. Fl. Ind. i. 289. P. lineare, Burm. Fl. Ind. 25, t. 10, f. 2. Paspalum dactylon, DC. Fl. Franc. iii. 16. Pasp. præcox, Walt. Fl. Carol. 75. Pasp. umbellatum, Lam. Illust. i. 177. Agiostis bermudian, Tus.ac ex Kunth. l. c. 259. A. filiformis, Koen. ex Kunth. l. c. 261. A. linearis, Retz. Obs. iv. 19. A. stellata, Willd. Sp. Pl. i. 376.—Rheede Hort. Mal. xii. t. 47.

Throughout India, Burma and Ceylon, ascending to 5000 ft. in the Himalaya. —DISTRIB. All warm countries.

Stem prostrate, often widely creeping and forming matted tufts with short ascending branches. Leaves short, subulate, glaucous; ligule harry. Spikes 2-5, 1-2 in., radisting, green or purplish; rachis very slender. Spikelets about  $\frac{1}{13} - \frac{1}{10}$  in.; gl. I and II spreading, ovate, acute, keels scabrid; III much larger cymbiform, keel and margin scabrid. Gram laterally compressed.—This plant is absent in Herb. Wallich. (Cat n. 3803)

#### 89 CHLORIS, Sw.

Perennial rarely annual grasses. Leaves flat or convolute. Spikelets 1-fld, 2-seriate, unilateral on solitary geminate fascicled digitate or whorled terminal erect or radiating spikes, not jointed at the base; rachilla jointed at the base, sometimes produced beyond gl. III and bearing one or more empty gls. Glumes 3 (with 1 or more upper neuter), I and II unequal, 1-nerved, narrow, keeled, acute mucronate or II awned; III 1-3-nerved, acute obtuse or 2-fid, usually awned; palea rather shorter, 2-nerved, complicate. Lodicules 2. Anther small. Styles free. Grain narrow, free.—Species about 40, warm regions.

This genus is wanting in the Wallichian Herbarium at the Linnean Society.—I find no character by which Schonefeldia, Kunth, can be separated generically from Chloris.

- \* Spikelets 1-fld. with no rudiment of another. Rachis of spike flattened.
- 1. **C. pallida**, Hook. f; annual, very slender, spikes 1-3  $\frac{1}{6}$  in. broad, awn very long capillary. Schænefeldia pallida, Edgew. in Journ As. Soc. Reng. xxi. (1852) 161, 183; Astchis. Cat. Panyab Pl. 166; Duthie Grass. N.W. Ind. 32, Fodd Grass. N. Ind. 52, t. 64. S. gracilis, Kunth Revis. Gram. i. 283, t. 53; Enum Pl. i. 258; Lisboa in Journ. Bomb. Nat. Hist. Soc. vii. (1893) 365.

BUNDELKUND, Edgeworth. CENTRAL INDIA, King.

Stem 10-18 in, simple or branched, almost filtform. Leaves 6-8 in., very narrow, flaccid, tips capillary; ligule a few hairs. Spike 3-5 in., golden-yellow, creet; rachis flattened, serrulate. Spikelets 1 in., subsessile, gl. I and II ovate-lanceolate, subaristately acuminate, 1-nerved, keels ciliate; I is shorter than II; III rather longer than I, sessile, ovate, 1-nerved, hairy, base bearded, tip minutely notched; awn \( \frac{2}{3}-1 \) in. long, capillary, curved; palea narrow, keels ciliate, tip 2-toothed. Grain very slender, acute, pericarp loose.—I have seen no authentic VOL VII.

specimen of E lgeworth's plant, but have received one so named from Dr. King. It agrees with Edgeworth's characters except in respect of an obscure passage in that author's description which reads as if gl. III was much shorter than II.

2. C. myosuroides, Hook. f.; annual, spikes solitary or geminate in. broad, awn very long capillary.

GANGETIC PLAIN; ravines near Etawah, Duthre.

- A much smaller plant than C. pallida, 6-12 in. high, with very narrow spikes 2-3 m. long, often recurred, smaller spikelets and shorter awas, 1-2 in. long, but perhaps only a variety.
- \*\* Spikelets 1-fld, rachilla produced beyond the flg. gl. and bearing one or two awns. Rachis of spike terete or angular.
- 3. C. delicatula, Clarke mss.; annual, spikes 5-10 capillary  $1\frac{1}{2}$ -2 in long alternate on the tip of the stem, awas 3-1 in. straight.

Chota Nagrobe; Mandu, Hazarabagh, Clarke. Pegu-Yomah, Herb. Kurz. Stem 3-12 in, erect, slender, wiry, subsimple. Leaves \frac{1}{2}-1 in., all cauline, spreading, subulate, concave or convolute; ligule of hairs. Spikes erect. Spikelets about 10 in.; gl. I very narrow, almost subulate; II 1 longer, rather broader, both set accously acuminate, keels scaberulous; III oblong, finely hairy, tip 2-lobed; rachilla produced and half as long as the gl., bearing 2-3 capillary awas; palea narrow, 2-toothed, keels glabrous. Grain very narrow, cylindric.—The Pegu specimens are larger than Clarke's.

4. C. incompleta, Roth. Nov. Sp. 60; tall, perennial, spikes 4-10 whorled 4-6 in. long, awns † in. straight. Steud Syn. Gram. 207. C. digitata, Steud. I.c.; Duthie Grass N.W. Ind. 23; Lisboa in Journ. Bomb. Nat. Hist. Soc. vii. (1893) 369 (excl. Syn). C. radiata, Heyne ex Roth. l. c. 61, Thw. Enum Pl. Zeyl. 371; Trim. Cat. Ceyl Pl. 409. C. Roxburghi, Edgew. in Journ As. Soc. Beng. xxi. (1853) 160, 183; Duthie Fodd. Grass. N. Ind. 54, t. 65; Lisboa I. c. 368. C. tetrameris, Trin. Gram. Unfl. 235; Steud. I.c. 206. Digitaria elongata, Spreng. Syst. i. 271. Gymnopogon digitatus, Nees in Wight Cat. n. 1753; Steud. Nom. Ed. II 1 713. Melica digitata, Roxb. Fl. Ind. i. 326; Kunth Enum. Pl. i. 37. Ctenium digitatum, Spreng. Syst. i. 274. Cynodon elongatus, Trin. in Spreng. N. Entdeck. ii. 64; Kunth l.c. Agrostis filiformis, Koenig in Herb. Banks. ex Trin. l.c.

Throughout the Plains of India, from the Panjab to Burma and southward. CEYLON. ANDAMAN ISLDS., Kurz.—DISTRIB. Affghan., China.

Stem 2-3 ft, or more, stout or slender, often branched, straight or geniculate. Leaves 6-12 by \(\frac{1}{2}-\frac{1}{2}\) in., flat; ligule of long hairs. Spikes very slender, spreading. Spikelets very variable, \(\frac{1}{2}-\frac{1}{2}\) in., narrowly lanceolate, green; gl. I not \(\frac{1}{2}\) of II which is narrowly lanceolate notched and shortly awned at the tip; III as long as II, ovatelanceolate, tip 2-toothed, base bearded; palea very narrow, keels nearly smooth; rachilla produced to half the length of the gl, bearing a very minute long awned gl. that is bearded at the base.

- \*\*\* Spikelets 1-fld.; rachilla produced beyond the fig. gl., and bearing 1-3 reduced empty gls. (In C. villosa, the gl. IV contains imperfect anthers.)
  - † Spikes 1-3; gl. III broadly cuneiform.
- 5. C. tenella, Roxb. Fl. Ind. i. 329; annual, slender, spike solitary, spikelets 3-4-awned, gl. III broadly cuneiform, upper margin truncate naked. Kunth Enum. Pl. i. 267; Spreng. Neue Entdeck. iii. 126; Steud.

Syn. Gram. 204, Dalz' & Gibs. Bomb. Fl. 296; ? Duthie Fodd. Grass. N. Ind. 54, t. 66; Lisboa in Journ Bomb. Nat. Hist. Soc. vii. (1893) 368. C. triangulata. Hochst. ex A Rich. Tent. Fl. Abyss. ii. 409; Steud. l.c. 203; Duthie Grass. N.W. Ind. 33. Ctenium indicum, Spreng. Syst. i. 274. Tetrapogon triangularis, Hochst. Pl. Arab. Schweinf. n. 967.

RAJPOOTANA; Oodeypore, Wingate (Herb Duthie). SCIND, Stocks. KHANDEISH,

Dalzell. South India, Roxburgh, Wight. - Distrib. Arabia, Abyssinia.

Stem 10-18 in. weak, branched from the base. Leaves 6-10 by 1-4 in., flaccid; ligule short, truncate. Spike 1-24 in., elect, flat. Spikelets large, 1 in. long and more, bifarious; gls. 5 or 6, I and Il ovate-lanceolate, hyaline; I acute; II } longer, shortly awned; III as long as II, corraceous, nerves distant from the margin and keel villous; awn subdoisal, straight, spreading; keels of palea finely hairy; IV half as long as III, narrower; V and VI still smaller, fan-shaped, awned.

++ Spikes 1-3; al. III ovoid, hirsute all over.

6. C. villosa, Pers. Syn. i. 87, perennial, stout, spikes 1-3, spikelets 4-awned, gl. III ovoid acute hirsute all over with long hairs, margins hyaline. Kunth Enum. Pl. i. 267, Suppl. 217, t. 16, f. 3; Jaub. & Spach Ill. Pl. Orient. iv. 40. t. 327; Coss. & Dur. Fl. Alger. 87; Steud. Syn. Gram. 204; Aitchis. Cat. Panjab Pl. 167. C. tetrapogon, Beauv. Agrost. 158. Tetrapogon villosus, Desf. Fl. Atlant ii. 388, t. 255; Trin. Fund. Agrost. 760; Boiss. Fl. Orient, v. 555; Duthie Grass. N.W. Ind. 33, Fodd. Grass. N. Ind. 55, t. 68.

The Panjab; Peshawur, Stewart; Rawul Pindu, Aitchison. Rajpootana; Oodeypore, King. Multan, Edgeworth — DISTRIB. Westward to the Canaries.

Stem 6-10 in., from a densely-tufted stout wooly base, which is clothed with equitant leaf-sheaths. Leanes 1-3 in., very narrow, acute, flat or twisted, rigid; ligule obscure. Spikes  $1\frac{1}{2}-2\frac{1}{2}$  in. by  $\frac{1}{3}-\frac{1}{2}$  in. broad, erect, pale yellow. Spikelets  $\frac{1}{6}$  in., obconic; gis 5, I and 1I lanceolate, shortly awned; I accumulate; II  $\frac{1}{3}-\frac{1}{4}$  longer, tip 2-toothed; III about as long as II, corraceous, with broad hyaline margins bounded by the lateral nerves, imperfectly triandrous, tip entire or minutely 2-toothed, hairs much longer than the gl. silky; awn spreading, keels of palea scaberulous; IV not half as long as III, also hirsute; V very small, cuneate; VI reduced to an awn.

††† Spikes 4-10; gl. III bearded at the base and on the margins above the middle.

7. C. virgata, Sw. Fl. Ind. Occ. i. 203; spikes 6-9, spikelets 2-awned, gl. II tip 2-fid awned in the sinus, III ovate bearded with long hairs above the middle, IV narrowly conciform. Trin. Gran. Unif. 136; Doell in Mart. Fl. Bras. ii. III. C. compressa, DC. Cat. Hort. Monsp. (1813) 94; Trin. Gram Unifl 230; Nees Agrost. Bras. 42, Fl. Afr. Austr. 240; Steud. Syn. Gram. 204. C. caudata, Trin. ex Bunge Enum. Pl. Chin. Bor. 70. C. cryptostachys, Steud in Schmidt Fl. Cap. Virid. 148. C. decora, Nees in Herb. Royle; Steud l. c. 205. C. elegans, Kunth Enum. Pl. i. 264. C. meccana, Horhst. & Steud. ex Schult. Ind. Sem. Hort. Hal. (1843) 7; Steud l.c.; Boiss. Fl. Orient. v. 554; Duthie Grass. N.W. Ind. 33. C. montana, Griseb. in Goett. Nachr. (1868) 84, Abhandl. 300; Duthie l. c. (non Roxb). C. pallida, Link Hort. Berol. i. 56, ii. 223. C. penicillata, Hort. ex Nees l c. (non Poir.). C. polydactyla, Durand Diss. Chlorid. (1808) 14, 22; Jacq. Eclog. Gram. 12, t. 9 (non Sw.). C. tetrastachys, Hack. mss. (ex Herb Duthie). Heterolepis elegans, Ehrt. ex Boiss. l. c.; Rabdochloa virgata. Beauv. Agrost 84.—Chloris, Wall. Cat. 3212 (in Herb Benth.).

RAJPOOTANA, and UPPER and LOWER GANGETIC PLAINS, and southward to Behab, and Central and Southern India. Western Tibet, Thomson. Buema. Wallach.—Disteib. Westward to Algeria; China, Mongolia, Trop. and S. Africa and America.

Stem rather stout, flattened, 8-12 in. high, usually leafy, decumbent and much proliferously branched below. Leaves rather broad, flat. acute; upper sheaths more or less inflated.—Australian specimen of this in Herb. Kew from Mueller, are ticketed C. barbata, Muell., var. with one empty gl. The Western Tibet habitat is remarkable; there are two specimens collected by Thomson, dated by himself at a time he was in Ladak, at an elevation not less than 12,000 ft.

8. C. barbata, Sw. Fl. Ind. Occ. i. 200; spikes 4-20, rachis scaberulous, spikelets 3-awned. Jacq. Eclog Gram. 10, t. 8; Kunth Enum. Pl. i. 264, Suppl. 209; Durand de Chlorid. 13. 22, Trin. Diss. i. 232, Sp. Gram. Ic. t. 306; Nees Agrost. Bras. 421; Steud. Syn. Gram. 204; Rosch. Fl. Ind. i. 331; Grah. Cat. Bomb. Pl. 234; Wight Cat. n. 1764; Aitch. Cat. Panjab Pl. 167; Thw. Enum. Pl. Zeyl. 371; Trim. Cat. Ceyl. Pl. 109; Duthie Grass. N.W. Ind. 33, Fodd Grass. N. Ind. 53, t. 34; Lisboa in Journ. Bomb Nat. Hist. Soc. vii. (1893) 367; Griseb. Fl. Brit. W. Ind. : 39; Benth. Fl. Hongk. 429, Fl. Austral. vii. 613 (excl. Syn. decora); Doell in Mart. Fl. Bras. ii. III. 67. Andropogon barbatus, Linn. Pl Jam. Pugill. 30, Mant. ii. 302.—Chloris, Wall. Cat. n. 3812.—Rheede Hort. Mal. xii. t. 51.

Throughout the plains of INDIA, BURMA, and CEYLON.-DISTRIB. Tropics

generally.

- Stem 1-3 ft., stout, erect from a geniculate or from a creeping proliferously branched base, simple or branching above, nodes with often large tufts of leaves having compressed equitant sheaths. Leaves 6-18 long, flat; mouth of sheaths ciliate; ligule obscure. Spikes \(\frac{1}{2}\)-4 in., suberect, strict or flexuous. Spikelets \(\frac{1}{2}\)-4 in, green or red-purple; gls. I and II acuminate, II much the longe-t; III ovate, more or less densely bearded above the middle and dorsally, tip acute or notched; awn \(\frac{1}{2}\)-\{\frac{1}{2}\} in.; III cuneiform, at length globose, cliate; IV much smaller, globose, awned.—Extremely variable in size and habit.
- 9. **C. polystachya**, Roxb Fl. Ind. i. 330; spikes many, rachis glabrous, spikel-ts very minute 3-awned. Kunth Enum Pl. i. 265; Spreng. Neue Entdeck. iii. 127; Grah. Cat Bomb. Pl. 235; Wight Cat. n. 1763; Duthie Grass. N. W. Ind. 33, C. Roxburghiana, Schult. Mant ii. 239; Steud. Syn. Gram. 206.—Chloris, Wall. Cat. n. 3811 (ex Wight l. c.).

DECCAN PENINSULA, Roxburgh, Wight.

- Stem 1-2 ft., ascending from a procumbent base. Spikes about 16, 2-3 in. long; gls. I and II lanceolate, acuminate; II much the longest; III ovate, acute, margins ciliate above or nearly glabrous; awn flexnous, IV like III but very much smaller, glabrous; V a minute-awned gl—Wight's is the only specimen I have seen, it is very much smaller than in Roxburgh's drawing.
- 10. **C. montana**, Roxb. Fl. Ind. i. 329; spikes 2-6, rachis glabrous, spikelets 4-awned. Kunth Enum. Pl. i. 265; Spreng. Newe Entdeck. iii. 127; Steud. Syn. Gram. 204; Lisboa in Journ. Bomb. Nat. Hist. Soc. vii. (1893) 369. U. decora, Thw Enum. 371 (excl. syn.). C. barbata, var. decora, Trim. Cat. Ceyl. Pl. 109. Tetrapogon tetrastachys, Hack. in Herb. Duthie (in part) n. 7759. Andropogon tetra-aristatus, Roxb. Ic. ined. n. 882.—Chloris, Wall. Cat. n. 3810.

Mountain districts of Coromandel, Roxburgh. Upper and Lower Gangetic Plans, and southward to Ceylon.

Stem erect or geniculately ascending from a creeping base, 4 in. to 21 ft., simple

or branched. Leaves 3-8 in., narrow, finely acuminate; mouth of sheath ciliate; ligule very short. Spikes 1-3 in., erect, very pale. Spikelets  $\frac{1}{3}$ - $\frac{1}{6}$  in.; gl. I and II both finely acuminate, or II which is much the largest obtuse and shortly awned; III ovoid, acute, upper margins more or less thickly bearded; IV and V cuneiform, glabrous or ciliate; VI minute, awned.—Very variable in the length of the spikes and size of the spikelets.

11. C. Wightiana, Nees in Wight Cat. n. 1766; Steud Syn. Gram. 206; spikes 3-5, rachis villous, spikelets 4-awned.—Chloris, Wall. Cat. n. 3809.

SOUTHERN INDIA, Wight.

Stem 4-6 in., stout, much branched, decumbent and leafy below, sometimes creeping. Leaves 2-4 by  $\frac{1}{8}-\frac{1}{8}$  in., flat, linear, acuminate and sheaths pubescent; ligule of hairs. Spikes red-brown, stout. Spikelets, gl. I and II ovate-lanceolate; I acuminate; II  $\frac{1}{4}$  longer, tip notched mucronate; III as long as II, obliquely broadly ovate in profile, suddenly narrowed into the terminal awn, lateral nerves marginal above and keel villously bearded; pulea very broad, keels ciliate; IV like III but smaller; V subglobose, glabrous, VI very minute.

#### DOUBTFUL AND REJECTED SPECIES.

C. MONOSTACHYA, Poir. Encycl. Suppl. ii. 238.—C. distachya (Kunth Rev. Gram. i. 291, t. 57. Eleusine monostachya, Spreng. Syst. i. 249. Leptochloa? monostachya, Reaum. & Sch. Syst. ii. 580. Cynosurus monostachyas, Vahl Symb. ii. 20) is a Mauritian grass, not found hitherto in India.

C. PENICILLATA, Pers. Syn. 1. 87; Kunth Enum. Pl i. 268; Steud. Syn. Gram 206. Cynosurus penicillatus, Vahl Symb. ii. 21. Eleusine penicillata, Spreng. Syst. i.

350.—Vahl's description does not enable me to identify this.

#### 90. ELEUSINE. Gaertn.

Annual or perennial grasses. Leaves long or short. Spikelets 3-12-fld. (fl. all but terminal perfect) sessile, 2-3-seriate and secund, forming digitate capitate or whorled spikes, laterally compressed, not jointed at the base; rachilla continuous between the fl. glumes. Glumes tew or many, keeled, I and II shorter than the flg., subequal or unequal, persistent; I lanceolate; II lanceolate, acute or acuminate, or very broadly ovate, or didymous with a short stou recurved awn; flg. gls. like the empty 3-nerved; palea complicate, keels strong. Lodicules 2, cuneate. Anthers 3, short. Styles short, distinct. Grain free, pericarp hyaline, loose. Seed rugose.—Species about 7, all warm countries.

The specimens of this genus are absent from the Wallichian Herbarium in the Linnean Society's rooms; the tickets alone existing there.

- I. ELEUSINE proper. Spikelets densely imbricate, pointing forward. Gl. II obtuse acute or acuminate.
- 1. E. indica, Gærtn. Fruct. i. 8; annual, erect, leaves flat, spikes digitate elongate, glumes subacute glabrous. Lamk. Ill. 1. 203, t. 48; Kunth Enum. Pl. i. 273, Suppl. 224, t. 16, f. 4; Steud. Syn. Gram. 211; Roxb. Fl. Ind. i. 345; Grah. Cat. Bomb. Pl. 235; Griff. Notul. iii. 52, 53, Ic. Pl. Asiat. t. 119, f. 156 & t. 150, f. 1; Thw. Enum. Pl. Zeylan. 371; Trumen Cat. Ceyl. Pl. 109; Aitchis. Cat. Panjab Pl. 168; Duthie Grass. N.W. Ind. 34, Fodd. Grass. N. Ind. 57, t. 69; Mag. Fl. Ind. Bat. iii. 385; Wall. Cat. n. 3816; Wight Cat. n. 1758; Boiss. Fl. Orient. v. 555; Benth. Fl. Hongk. 429, Fl. Austral. vii. 615; Nees Agrost. Bras. 439, Fl. Afr. Austr. 251; Griveb. Fl. Brit. W. Ind. 540. E. distachyu, Trin ex Stud.

Nom. Ed. II. i. 549. E. distans, Manch Meth. 210. E domingensis, Sieb. ex Schult Mant. ii. 323. E. Gouint, inæqualis, rigidifolia, & scabra, Fourn. ex Hemsl. Biol. Centr. Amer. iii. 565. E. gracilis, Salisb. Prodr. 19. E. marginata, Lindl. in Mitch. Three Exped. i. 319; Steud. Syn. Gram. 212. E. tristachya, Lamk l. c.; Kunth Revis. Gram. i. 92, Enum. i. 273; Steud. l. c. Cynosurus indicus, Linn Sp. Pl. 72. C. Ara, Herb. Ham. ex Wall. Cat. n. 3816 I. PC. pectinatus, Lamk Encycl. ii. 188. PLeptochloa pectinata, Kunth Revis. Gram. i. 91, Enum. Pl. 272; Steud. l. c. 210. Paricum compressum, Forsk. Fl. Eg. Arab. 18. Paspalum dissectum, Kniphof. Cent. Bot in Oria. t. 11. Triticum geminatum, Spreng Syst. i. 326. Agropyrum geminatum, Schult. Mant. iii. 655.—Rheede Hort. Mal. xii. t. 69.

Throughout the low country of India (ascending to 5000 ft. in the Himalaya) to PENANG and CEYLON.—DISTRIB. Tropical Old World; introd. into the New.

Stem 1-2 ft., stout, rott. Leaves distichous, narrow, flaccid, acuminate; sheaths flattened, chlare; ligule obsolete. Spikes 5-7, 2-5 in. long, all in a terminal whorl, or with sometimes 1 or 2 lower down. Spikelets very variable in size,  $\frac{1}{13}$ - $\frac{1}{6}$  in, 3-5-fld.; quite glabrous; gl. I small, 1-nerved; II 3-nerved; III and succeeding ovate, subacute. Giam oblong; pericarp loose, but persistent; seed oblong rugose. Cult. form. E. cobacana, Gaertn. Fruct. i. 8, t. 1; stem stout 2-5 ft. otten

Cult. form. E. coracana, Gaerin. Fruct. i. 8, t. 1; stem stout 2-5 ft. often as thick as the thumb, leaves broad, spikes very stout up to 6 in. long by \( \frac{1}{2} \) in. broad straight or incurved, grain globose. Lamk. Illustr. t. 28; Schreb. Gram. ii. t. 35; Trin. Sp. Gram. Ic. t. 70; Steud. Syn. Gram. 211; Panz. in Muench. Denkschr. iv. (1814) t. 8; Nees Fl Afr. Austr. 251; Kunth Enum. Pl. i. 273, Suppl. 225; Roxb. Fl. Ind. i 342; Wall. Cat. n. 3817; Grah. Cat. Bomb Pl. 235; Atchis. Cat. Panjab Pl. 168; Trim. Cat. Ceyl. Pl. 109; Duthie Grass. N.W. Ind. 34, Fodd. Grass. N. Ind. 57, t. 69, Field & Gard. Crops, 15, t. 28; Maquel Fl. Ind. Bat. in. 386; Liboa in Journ. Bomb Nat Hist. Soc. vii (1893) 373. E. cerealis, Salub Prodr. 19 E. sphæro-perma, Stokes Bot. Mat. Med. i. 49. E. stricta, Roxb. l. c. 343; Kunth l. c; Steud l. c. E. Tocussa, Fiesen. in Mus. Senkenb. ii. (1817) 141 Cynosurus coracanus, Linn. Syst. Ed. II. 875.—Rheede Hort Mal. xii. t. 78.—Cultivated in all parts of India.

2. E. flagellifera, Nees in Linnæa, xvi. (1842) 220; perennial, prostrate, proliterously branched, leaves very short glaucous, spikes digitate, gl. II lanceolate mucronate or aristulate, III hairy acute. Steud. Syn. Gram. 211; Duthie Grass. N. W. Ind. 34, Fodd. Grass. N. Ind. 57, t. 37; Boiss. Fl. Orient. v. 655. E. arabica, Hochst. ex Steud. l. c.; Aitchis. Cat. Panjab Pl. 107; Lisboa in Journ. Bomb. Nat. Hist. Soc. vii. (1893) 377. E.? stolonifera, Br. in Salt Abyss. App. 63. ? Ochthocloa dactyloides, Edgew. in Journ. As. Soc. Beng. xi. (1842) 27.

PLAINS of the PANJAB, Royle, Jacquemont, &c. SCIND, Stocks, &c.—DISTRIB.

Affghan, and westward to N. Africa.

Stems stout or slender, smooth, stiff, widely spreading, rooting at the distant thickened leaty nodes, and sending up slender branches; internodes 4-8 in. Leaves \(\frac{1}{2}-\frac{1}{2}\) in., rigid, recurved, flat or tortuous; ligule harry. Spikes 3-6, 1-1\frac{1}{2}\) in. long, very variable in breadth, \(\frac{1}{6}-\frac{1}{2}\) in.; rachis pubescent. Spikelets imbricate, subpedicelled, \(\frac{1}{3}-\frac{1}{2}\) in. long, 4-6-fid., green or brownish; gl. I small, ovate, acute, membranous; II twice as large, conaceous with membranous margins; III ovate-lanceolate, acuminate, chartaceous, 3-nerved, mid-nerve compound, sides and membranous margins below harry; palea elliptic-oblong, keels harry.—Ochthocloa dactyloides, Edgew., is a doubiful plant of which I have seen no specimens. It is not included in any of Duthie's works on the Grasses of N.W. India. It might be traced by its habitat. Loodiana, Jassowala, on tumuli with Capparus aphylla.

3. B. brevifolia, Br. in Wall. Cat. n. 3815; annual, stems short

creeping and rooting, leaves small lanceolate acuminate, spikes very many short crowded in globose heads, fig. gls. and palea villously bearded. E. oligostachya, Herb. Wight, n. 3332. E. Wallichii, Munro mss. Koeleria brevifolia, Spreng Pugill. ii. 21. K. lagopoides, Panz. ex Spreng. l.c. Dactylis brevifolia, Koen. ex Willd. Sp. Pl. 1. 410 (excl. Syn.); Roxb. Fl. Ind. i. 341; PSteud. Syn. Gram 298. D. cynosaroides, Koen ex Roth Nov. Sp. 74 (non Linn). D. geniculata, Roxb. Ic Pict. ined. t. 346 (non Burn.). Poa brevifolia, Kunth Revis. Gram. i. 111, Enum. Pl. i. 324. P. lagopoides, Nees ex Wight Cat. n. 1790. Æluropus brevifolius, Nees ex Steud. Nom. Ed. II. i. 30; Herb. Wight Prop. 1792. Æ. lævis, Trin. Fund. Agrost. 143, t. 12. Æ. pubescens, Steud. Nom. l.c. Eragrostis brevifolia, Benth. in Hook. Ic. Pl. xiv. 51. Triodia cynosuroides, Spreng. Syst. Veg. i. 331. Cyperus Coracana, Herb. Heyne ex Wall l.c.

Sandy shores of the COROMANDEL and CARNATIC coasts, Heyne, &c.

Annual. Stems many, spreading from the root, 2-4 in. long, stout or slender. Leaves 1-2 in., flaccid or rigid, lanceolate, acuminate, serrulate; ligide obsolete. Heads of spikes quite globose, \(\frac{1}{2}\)-\frac{2}{3} in. diam., of many (rarely few) 4-10-fld. ovate sessite spikelets \(\frac{1}{2}\)-\frac{1}{3} in. long; gl. I and II subequal, margins hyaline, broadly ovate, acuminate or cuspidate, glabrous; I 1-3-nerved; II 3-5-nerved, nerves close to the middle line; III and following very broadly ovate, cuspidately acuminate, 3-nerved, keel and nerves and keels of ovate palea all villous below the middle. Anthers minute. Styles long, slender. Grain orbicular.—See remarks under Elwropus.

4. E. verticillata, Rowb. Fl. Ind. i. 346; annual, erect, leaves flat, spikes scattered or whorled very many-fld, glumes acute glabrous. Steud. Syn. Gram. 211; Artchis. Cat. Punjab Pl. 168, Duthie Grass. N. V. Ind. 34, Fodd. Grass. N. Ind. 58. t. 70; Lisboa in Journ. Bomb. Nat Hist. Soc vii. (1893) 377; Benth. Fl. Austral. vii. 616. E. racemosa, Heyne in Roth. Nov. Sp. 80. Leptochloa? racemosa & verticillata, Kunth Revis. Gram. i. 91, Enum. Pl. i. 272; Steud. l. c. Aerachne eleusinoides, Wyht & Arn. in Wight Cat. n. 1760; Nees ex Steud. l. c. A. verticillata, Lindl. Introd. Nut. Syst. Ed. II. 381.—Eragrostidi affine, Wall. Cat. n. 3882, ex Wight Cat. l. c.

Plains of India; in pasture ground, Roxburgh, &c. KASHMIR, Clarks.—DISTRIB.

Trop. Asia, Africa, and Australia.

Stem 1-3 ft., stout or slender, simple or branched, soft. Leaves rather broad, flaccid, acuminate, glabrous; sheath compressed; ligule a few hairs. Spikes few or many, \(\frac{1}{2}\)-3 in. long, in tiers or whorls, or opposite or alternate, subcrect; rachis slender. Spikelets \(\frac{1}{2}\)-\frac{1}{4} in., 8-12 fld, shining; glumes small; I and II broadly ovate, finely acuminate or aristulate; flg. gls. \(\frac{1}{12}\) in, very broadly ovate, 3-nerved, keel excurrent, lateral nerves ending in small teeth. Grain rugose, pericarp caducous.

- II. DACTYLOCTENIUM, Willd. (Gen.). Spikelets erect, at right angles to the rachis of the spike. Glume II short, suborbicular, abruptly shortly awned.
- 5. E. ægyptiaca, Desf. Fl. Atlant. i. 85; annual, leaves flat, spikes digitate, glumes rigid cuspidate glabrous. Roxb. Fl. Ind. i. 344; Wall Cat. n. 3818; Griff. Notul. iii 51, Ic. Pl. Asiat. t. 139, f. 79; Trim. Cat. Ceyl. Pl. 109; Benth. Fl. Austral. vii. 615; Duthie Grass. N.W. Ind. 34, Fodd. Grass. N. Ind. 56, t. 35. E. ciliata, Rafin. in Desv. Journ. Bot. iv. (1814) 273. E. cruciata, Lamk. Illustr. i. 203, t. 48, f. 2. E. mueron.ta, Stokes Mat. Med i. 150; Lisboa in Journ. Bomb. Nat. Hist. Soc. vii. (1893) 376. E. pectinata, Moench Meth. Suppl. 68. E. piostiata, Spring. Syst. i. 350.

E. radulans, B. Prodr. 186. Dactyloctenium ægyptiacum, Willd. Enum. Hort. Berol. 1029; Beauv Agrost 72, t. 15, f 2; Kunth Enum. Fl. i. 261, Suppl ii. 204: Steud. Syn. Gram. 211; Grah. Cat. Bomb. Pl. 235; Dalz. & Gibs. Bomb. Fl. 297; Thw. Enum. Pl. Zeyl. 371; Aitch. Cat. Panjab Pl. 167; Miq. Fl. Ind. Bat. iii. 384; Boiss. Fl. Orient. v. 556; Griseb. Fl. Brit. W. Ind. 540; Baker Fl. Maurit. 452. D. distachyum, Bojer Hort. Maurit. 370. D. Figarei, Notar. in Ann. Sc. Nat. Ser. III. ix. (1848) 325. D. meridionale, Ham Prodr. Pl. Ind. Occ. 6. D. mucronatum, Willd. l. c.; Trin. Sp. Gram. Ic. t. 69; Steud. l. c.; Wight Cat. n. 1761. D. prostratum, Willd. l. c.; Steud. l. c. D. radulans, Beauv. Agrost. 72; Kunth l. l. c. c. 262, 204; Steud. l. c. Cynosurus ægyptius, Linn. Sp. Pl. 72. C. Cavara & Macara, Hb. Ham. & Wall. l. c. B. C. C. distachvus, Rottl. ex Steud. Nom. Ed. II. i. 465. Chloris mucronata, Mich. Fl. Am. Bor. i. 59. Cenchrus ægyptius, Beauv. Agrost. 157. Rhabdochloa mucronata, Beauv. L. 84. Ægilops saccharmus, Walt. Fl. Carol. i. 249.—Rheede Hort. Mal. xii. t. 69.

Throughout the low country of India and Burma, to Malacca and Ceylon,—DISTRIB. Warm regions of the Old World, introd. into the New.

Stem erect, 6-18 in. high, or prostrate spreading and rooting, often proliferously branched at the thickened nodes. Leaves distichors, acute or acuminate, ciliate sheaths compressed; ligule 0. Spikes solitary or 2-5, ½-1 in. long, all terminal, stout, rachis mucronate at the tip by the thickened excurrent midrib. Spikelets densely crowded, ½-10 in. long, 3-4-fld., glabrous; glumes almost pungent; I ovate, acute; II broadly ovate, obliquely cuspidately awned, as are the following, cusps recurved; palea very broad, 2-fld, keels hispid. Grain globose, very rough, pericarp evanescent.—Specimens in Herb. Rottler named "Cynosurus ciliaris, C. distachyus, nob, an C. ægyptii, var.:—sandy shores of the Ocean," are somewhat intermediate between ægyptiaca and arvitata, having the foliage of the former and habit of the latter. This and Wight's n. 1761 b. "Dactyloct. mucronatum, β. repens = D. prostratum, Willd.," are the same.

6. E. aristata, Ehrenb. ex Boiss. Fl. Orient. v. 557; perennial, slender, prostrate, proliferously branched, leaves short glaucous, spikes very short capitate, gl. II abruptly shortly awned. E. glaucophylla, Munro ex Benth. in Journ. Linn. Soc. xix. (1881) 107. E. scindica, Duthie Fodd. Grass. N. Ind. 58, t. 36; Lisboa in Journ. Bomb. Nat. Hist. Soc. vii. (1893) 377. Dactyloctenium glaucophyllum, Courb. in Ann. Sc. Nat. Ser. IV. xviii. (1862) 133. D. scindicum, Boiss. Diagn. Ser. II. iv. 131, Fl. Orient. l. c.

The Panjab, Rajpootana, Malwa, Scind, and British Beluchistan .-

DISTRIB. Affghan., Arabia, Nubia.

Stem smooth, stiff, widely spreading, rooting at the distant thickened woody leafy nodes, and sending up very slender branches 4-12 in. long; internodes 2-4 in. Leaves 1-1½ in, acuminate or pungent, margins chiate with long tubercle-based hairs; basal sheaths hairs; ligule obsolete. Spikes 3 or more, ½-½ in. long, spreading or decurved, chiate or bearded at the base, midrib of rachis excurrent. Spikelets short, 3-4-fid., rachilla glabrous; gl. I and II coriaceous, 1 nerved, margins membranous, I small, broadly oblong, apiculate; II very broad, sometimes didymous when spread open; awn stout, subulate, incurved or recurved; III and following longer than II, very broadly ovate, subacute, glabrous; palea broad, keels scaberulous. Grain ovoid, rugose.—Habit of E. flagellyfera.

## 91. DINEBRA, Jacq.

An annual leafy grass. Leaves flat. Spikelets 2-3-fld., small, crowded, biseriate on one side of slender spreading or deflexed spikes that are

collected in narrow pyramidal racemes, not jointed at the base; rachilla slender, j inted at the base, produced beyond the fl. gls. and bearing an imperfect gl. Glumes 4-5, I and II empty, persistent, much longer than AII and IV, lanceolate, awned, 1-nerved, keeled; II \(\frac{1}{2}\) longer than I; III and IV very small, broadly ovate, subacute, hyaline, 1-nerved; palea hyaline. Lodicules 2. Anthers 3, small. Styles free. Grain ovoid, trigonous, wrinkled, free.

D. arabica, Jacq. Fragment. 77, t. 121, f. 1; Beauv. Agrost. 98, t. 16, f. 2 (Dineba); Trim. Cat. Ceyl. Pl. 109; Duthie Grass. N.W. Ind. 34, Fodd. Grass. N. Ind. 55; Lisboa in Journ. Bomb. Nat. Hist. Soc. vii. (1893) 372. D. ægyptiaca, Del. Fl. Ægypt. 25, t. xi. f. 3 (Dinaeba). D. retroflexa, Panz. in Denksch. Acad. Muench. iv. (1813) t. 12; Boiss. Fl. Orient. v. 557. Leptochloa arabica, Kunth Revis. Gram. i. 91; Enum. Pl. i. 271, Suppl. 221; Wight Cat. n. 1756; Aitch. Cat. Panjab Pl. 167. L. calycina, Kunth l. l. c. c. 91, 272; Steud. l. c. 210; Dalz. & Gibs. Bomb Fl. 297. L. coromandeliana, Steud l. c. 209. Eleusine calycina, Roxb. Fl. Ind. i. 346. Cynosurus coromandelianus, Herb. Rottl. C. paniculatus, Herb. Roxb. C. retroflexus, Vahl Symb. ii. 20. Dactylis pasnaloides, Willd. Enum. Hort. Berol. 111. D. cynosurvides, Koen. mss in Herb. Mus. Britt. D. madraspatensis, Herb. Roxb.—Dinebra, Wall. Cat. n. 3814.

WESTERN PENINSULA, from Khandeish and the Carnatic southward. CEYLON,

Trimen (introduced).—DISTRIB. Affghan. and westward to Senegal.

Stems 1-3 ft., tufted, branching from the base, erect or geniculately ascending, leafy throughout. Leaves flat, 3-8 in., flaced, finely acuminate, sparsely harry; ligule short. Racemes 4-12 in., erect; rachis strict, stout, smooth. Spikes \frac{1}{2}-2\frac{1}{2} in., opposite alternate or whorled, sessile, green or pale yellow, shining, at first erect, at last deflexed. Spikelets closely imbricate, about \frac{1}{6} in. long; gl. I and II with straight termina awns.—Dinebra verticillata, Wight ex Steud. Syn. Gram 209, is Myriostachys Wightiana.

## 92. LEPTOCHLOA, Beauv.

Annual grasses. Leaves flat or involute. Spikelets very minute, compressed, 1-many-fld., sessile or shortly pedicelled, alternate and unilateral on the very slender spike-like branches of a lax panicle, not jointed at the base; rachilla produced between the fig. gls., jointed at the base. Glumes 3- many, membranous; I and II unequal, oblong or lanceolate, 1-nerved; III and following broadly ovate, subacute or obtuse, 3-nerved, nerves usually hairy, 2 lateral near the margin; palea nearly as long as the gl., 2-keeled. Lodicules 2, cuneate. Anthers 3, short. Styles tree. Grain subglobose oblong obovoid or 3-gonous, closely invested by the gl. and palea.—Species about 12, tropical and subtropical.

I have had great difficulty in disposing of the synonymy of this genus, the species of which are in a chaotic condition, and I regard the result here attained as tentative only, some of the synonyms adopted being little better than guesses, though the results of much study. The genus is absent in the Wallichian Herbarium of the Linnæan Society.

- \* Leaves short, broad, membranous.
- 1. **L. uniflora**, Hochst. ex A Rich. Tent. Fl. Abyss. ii. 409; spikelets 1-fld., gl. I and II linear-lanceolate, III ovate acuminate. Trim. Cat. Ceyl. Pl. 109. L. gracilis, Wight ex Steud. Syn. Gram. 213. Cynodon gracilis, Ners ex Steud. l.c.; Thw. Enum. Pl. Ceyl. 371; Wight Cat. n.

1752. Poa chinensis, Burm. Fl. Ind. 27, t. xi. f. 3 (non Linn.). Agrostis montana, Herb. Rottler.—Leptochloa, Wall. Cat. n. 8895.

TINNEVELLY; at Palamcotta, Rottler. CEYLON, dry parts of the island.—DISTRIB.—Trop. Afric.

Stem 1-2 ft., very slender, geniculately ascending from a creeping base. Leaves 1-3 by  $\frac{1}{2}-\frac{2}{3}$  in., elliptic-lanceolate, acute and apiculate, very thin, flaccid, base narrowed; ligule short, hyaline, lacerate. Panicle 6-8 in , very slender; spikes capillary, 2-3 in. Spikelets about  $\frac{1}{16}$  in.; nerves of gI III and palea fringed with long hairs. Grain not seen—Judging from Burmann's figure of the leaf his Poachinessis is, I think, L. unifora.

\*\* Leaves long, narrow.

2. L. polystachya, Benth. Fl. Austral. vii. 617 (non Kunth), panicle elongate contracted, spikes  $1-\frac{1}{3}$  in. crowded erect. spikelets 1-fld. L Neesii, Benth. in Journ. Linn. Soc. xix. (1881) 108; Trim. Cat. Ceyl. Pl. 109. Cynodon Neesi, Thw. Enum. Ceyl. Pl. 371. C. polystachyus, Br. Prodr. 187. C. virgatus, Nees ex Wall. Cat. n. 8894; Wight Cat n. 1751; Steud. Syn. Gram. 213. Agrostis virgatu, Herb. Rottl. & Herb. Madr. ex Wall l. c.; A. chinensis, Koen. ex Herb Rottl.

The Carnatic, Rottler, Wight. CEYLON; Trincomalce, Glenie.—DISTRIB. Australia.

Stems erect, 2-3 ft., stout or slender, sometimes proliferously branched below; lower nodes glabrous or bearded. Leaves 12-18 in., convolute, rarely flat, finely acuminate. Panicle 6-10 in., flexuous; branches filiform. Spikelets \(\frac{1}{20}\) in., closeset, pale; gls. I and II unequal, ovate-lanceolate, rather longer than III, pale green; III broadly ovate, subacute, 3-nerved, nerves and keels of palea ciliate. Grain oblong, deeply grooved on one side.—The form of the panicle differs much from that of the following; but the spikelets and glumes are very much alike. L. polystachya, Kunth, an American plant, is a species of Diplachie.

3. L. filiformis, Roem. & Sch. Syst. ii 580; spikes 2-3 in., spikelets 2-3-fid. Kunth Enum. Pl. 1. 270, Suppl. 220; Steud. Syn. Gram. 209; Wight Cat. n. 1754; Thvv. Enum. Pl. Zeyl. 271; Trim. Cat. Ceyl. Pl. 109; Duthie Grass. N.W. Ind. 192; Astchis. Cat. Panjab. Pl. 167; Mig. Fl. Ind. Bat. iii. 389. E. chinensis, Duthie Fodd. Grass. N. Ind. 59, t. 71. P. E. thiformis, Pers. Syn. i. 87. Aira filiformis, Roxb. Fl. Ind. i. 326; Herb. Ham. ex Wall. Cat. n. 3804 Poa malabarica, Klein ex Steud. Nom. Ed. ii. 303, 60. P. chinensis, Herb. Rottler. P. coutracta & panicea, Retz. Obs. iii. 11. P. virgata, Roth. Nov. Sp. 66; Wight l. c. Festuca tenuis & F.? Basnia, Herb. Ham. ex Wall. Cat. n. 3805 C. D.—Leptechloa, Wall. Cat. 3804, 3805.

Throughout India and BURMA in the low country. CEYLON; Colombo, Fer-

guson.-Distrib. Trop Asia, Africa and America.

Stem 1-2 ft., slender, geniculately ascending. Leaves 4-10 in., flat, flaccid, finely accuminate; ligule short. Panicle 4-8 in., contracted or diffuse, branches very many almost capillary; spikelets  $\frac{1}{10}$  in., gl. I and II oblong-lanceolate, acute; III and IV broadly ovate, nerves and palea clinte. Grain oblong, closely invested with the gl. and palea.—I have followed my predecessors in reterring this Indian grass to Leptochloa filiformis, R. & S., though that plant is described as American, and as having glabrous flowers; a character apparently confirmed by Jacquin's drawing of its synonym Eleusine filiformis, Pers. (Jacq. Eclog. Gram. t. iv.) and by an observation of Doell in Mart. Fl. Bras. ii III. 93. On the other hand, I find the nerves of gl. III to be invariably harry in American specimens corresponding with Jacquin's plate and the description of L. filiformis, and hence must suspect that this very meconspicnous character (except under a good magnifying power) has been overlooked.

Amongst other grasses referred to filiformis, but which from want of materials or descriptions or both I refram from citing, is L. tenerrima, R. & S., which is described as having a 2-lobed tip of gl. 111, a character which is approached only in L. obtusifora, but which is easily produced in the very concave glume by a slight force in analyzing that organ. Bentham Fl. Hongk. and Fl. Austral. refers it to L. chinensis, to which its few (2-3-) fid. spikelets is opposed. It is probably a weak state of L. filiformis. With regard to Aira filiformis, Koen., in Roxb. Fl. Ind., Mr. Rendle informs me that there are in the British Museum a specimen so named by Koenig himself, and another authenticated by Roxburgh, and that both are the Indian L. filiformis. Roxburgh's characters of "leaves ensiform" and "calyx large" are therefore erroneous.

4. L. chinensis, Nees in Syll. Ratisb. i. (1824) 4, Agrost. Bras. 432; stem tall stout, spikes 2-4 in.; spikelets 4-6-fld., gl. iii. obtuse and apiculate. Mig. Fl. Ind. Bat. iii. 389 (ercl. Syn. Burm.). Steud. Syn. Gram. 209; Benth. Fl. Hongk. 430, Fl. Austral. vii. 617; Thw. Enum. Pl. Zeyl. 371; Trim. Cat Ceyl. Pl. 109; Wall. Cat. n. 8896; Wight Cat. n. 1755; Duthie Grass N.W. Ind. 35 (excl. syn.), Fodd. Grass. N. Ind. 59, t. 71; Lisbou in Journ. Bomb. Nat. Hist. Sic. vii. (1893) 372 (excl. Syn. tenerrima). E. decipiens & imbecilla, Steud. l. c. 279. Cynodon virgatus, Nees in Wight Cat. n. 1751. Poa as henes, Roem. & Sch. Syst. ii. 574. P. decipiens, Br. Prodr. 181. P. chinensis, Linn. Sp. Pl. 69 (excl. Syn. Burm.); Roxb. Fl. Ind. i. 332. P. malabarica, Retz. Obs. v. 19. P. secundaria, Heyne in Herb. Rotil.

Throughout India and Burma, in moist places. CEYLON, Atakalam Corle,

Thwaites. - DISTRIB. China, Japan, Malaya, Australia.

Stem erect, or geniculately ascending, 2-4 ft, often as thick as a goose-quill. Leaves 6-18 in., flat or convolute, scaberulous; sheaths loose; ligule short, lacerate. Puncle 6-18 in.; brunches opposite or alternate, suberect or spreading. Spikelets about  $\frac{1}{10}$  in.; nerves of gl. III and keels of palea pilose. Grain loose, obtusely trigonous, subrugose.—A much more robust species than L. filiformis, but some of its forms are quite as slender as is that plant.

5. **L. obtusiflora**, Horhst. in Flora, xxxviii. (1835) 203; stem stout tall, panicle branches few erect, spikelets in 6-fld., gl III oblong-ovate tip truncately rounded or retuse erose, grain obovoid triquetrous. Steud. Syn. Gram. 209. Poa maysorensis, Rottler mss.

SOUTHERN INDIA; Cochin, at Ayacotta, Rottler. (June 10th, 1808) - DISTRIB.

Afr. trop

Stem 2 ft. and upwards, erect, branched, leafy. Leaves narrow. Panicle of 9-12 simple erect branches 2-3 in. long. Spikelets alternate, sessile, as in L. chinensis, but larger with fl. glumes \( \frac{1}{12} \) in. long, more oblong, with broad more or less truncate toothed tips, sometimes emarginate or reture with an apiculus; keels of palea quite smooth. Grain larger than in chinensis, triquetrous, ventrally depressed.—Rottler's specimen is imperfect; he has labelled it "Poae species malabaricæ proxima, P. maysorensis, nob," and added the above description of the stem leaves and panicle, which exactly accord with African ones. It is very near L. chinensis, but of the great many plants of that species which I have examined none have the large spikelets and glumes of this. The habitat is an old fortified town near Cochin, that had great trade with Africa, whence the plant was probably introduced with merchandise.

#### DOUBTFUL INDIAN SPECIES.

I. CYNOSUBOIDES, Roem. & Sch Syst. ii. 579; Kunth Enum. Pl. i. 270; Steud. Syn. Gram. 208. L. filiformis, Beauv. Agrost. 71. Cynosurus filiformis, Vahl Symb. ii. 20. Chloris filiformis, Pour. Encycl. Suppl. ii. 238. Pollinia filiformis,

Spreng. Syst. Veg. i. 288; spike solitary, spikelets 3-fld.—Probably not a Leptochlog.

#### 93. DICHETARIA, Steud.

A tall slender perennial grass. Leaves long, narrow, flat. Spikelets 1.fld. with the very long filiform gl. of a 2nd, sessile or shortly pedicelled, distantly scattered along a very long filiform rachis, very narrow, terete, not jointed at the base; rachilla not produced beyond gl. III, jointed at the base. Glumes 4, I and II unequal, empty, separately deciduous, narrowly lanceolate, acuminate or dorsally 10unded, subaristate, entire or minutely 2-toothed below the tip, 3-nerved; III linear, terete, coriaceous, 3-nerved, tapering into a very long rigid recurved awn with two erect setwat its base; IV, a filiform, awn-like, recurved glume, minutely 2-aristate above the middle; palea very narrow, 2-cuspidate, keels scaberulous Lodicules large, obliquely cuneiform, fleshy. Anthers 3, very slender. Styles distinct, stigmas slender. Grain narrow.

**D. Wightii,** Neer ex Steud Syn. Gram. 145. Gymnopogon rigidus, Thw. Enum. Pl. Zeyl. 372, 444; Trim. Cat. Ceyl. Pl. 109. Arıstida linearifolia, Rottl. mss.—Herb. Wight n. 1035.

SOUTHERN INDIA; Tranquebar, Rottler; probably Travancore, Herb. Wight.

CEYLON, in dry parts of the island, Thwaites.

Stems, erect. 2-3 ft., tufted on a creeping woody rootstock. Leaves as long as the stem, \(\frac{1}{2}\)-\(\frac{1}{2}\) in. broad, quite glabrous, margins smooth; ligule of hairs. Panicle 12-18 in., rachis and few short tranches filiform, quite smooth. Spikelets with the awns 1\(\frac{1}{2}\) in. long, green; gl. I shorter than II, which is about \(\frac{1}{2}\) in. long and about \(\frac{2}{3}\) as long as III below the short lateral bristles; rachilla below III bearded. —I think Steudel was right in separating the grass from Gymnopogin, all the species of which are American, and from which it differs totally in habit, and in the form of the spikelets, gl. III of which greatly exceeds I and II.

## Tribe IX. Festucacez. (See p. 7.)

## 94. POMMEREULLA, Linn. f.

A short stout perennial creeping grass. Leaves short, strap-shaped. Spikelets 2-3-fld., distichously racemed, narrowly turbinate, villous, not jointed on their pedicels; rachilla stipitiform, narrowly obconic (resembling a callus), villous, jointed at the acute base, crowned by empty deformed fl. gls. Glumes 5-7, I and II narrow, persistent, empty; I lanceolate, 1-nerved; II longer, oblong-lanceolate, 3-5-nerved; III and IV embracing V and VI, empty, flabelliform, 4-lobed, dorsally shortly awned; V-VII flg. cuneate-obovate, 3-lobed; palea ovate, acute, nerves 2, pubescent. Lodicules 2, membranous. Stamens 2-3, anthers small. Styles distinct. Grain oblong, compressed, free.

P. Gornucopiæ, Linn. fil. Diss. Nov. Gram. 31, & Suppl. 105; Vahl Enum. Pl. ii. 393; Beauv. Agrost. 91, t. 18, f. 6; Roxb. Pl. Corom. ii. 17, t. 131, Fl. Ind. i. 331; Roth. Nov. Sp. 33; Kunth in Ann. Sc. Nat. Ser. I. xxiii. (1831) t. 7, Enum. Pl. i. 321; Steud. Syn. Gram. 249; Trumen Cat. Ceyl. Pl. 109; Wall. Cat. n. 8904; Wight Cat. n. 1769. P. elongatum, Wintt & Arn. in Wight Cat. n. 1770. Pennisetum Cornucopiæ, Heyne ex Wall. l. c.

MYSORE and the CARNATIC, Heyne, Wight. CEYLON; Northern Province, Trimen.

Stem as thick as a crow-quill, rooting at the nodes; branches erect, stout, leafy, flattened. Leaves 1-3 in., distichous, flat, exactly linear, coriaceous, tip rounded, margins sparsely ciliate; sheath long or short, broad, flattened; ligule a ciliate ridge. Raceme \( \frac{1}{2} - 2 \) in., usually half sunk in the uppermost sheath, rarely with an exserted naked peduncle and sometimes 2 erect branches \( Spikelet \), \( \frac{1}{10} - \frac{1}{0} \) in., shortly pedicelled, white, tomentose, awns shortly exserted; gls. I and II much shorter than the spikelet, keels nearly smooth, bases narrowed; II inserted much above I, its base tightly embracing the rachilla; III and IV narrowed into a tomentose stipes, embracing V and VI, 4-lobed with a short dorsal awn, disk coriaceous, margins and lobes hyaline; V-VII cuneately obovate, 3-lobed.—A very curious grass. The turbinate spikelets resemble clusters of those of Gracilea, but are not jointed at the base, and their structure is totally different. The above characters are drawn from many analyses, but they will no doubt be found to vary in a more extended suite of specimens.

## 95. PAPPOPHORUM, Nees.

Perennial grasses. Leaves narrow. Spikelets 1-8-fid., in contracted or spiciform panicles, not jointed at the base; rachilla jointed at the base. Gl. I and II membranous, keeled, 3-many-nerved, persistent; III and IV much shorter (except the awns), coriaceous, orbicular, concave, obscurely many-nerved, cleft into 9 or more equal or alternately longer long-ciliate erect awns; IV and V usually imperfect; palea small, broad, 2-keeled. Lodicules 2, dolabriform. Stamens 3. Sty'es short, distinct; stigmas plumose. Grain ovoid or oblong, free.—Species about 20, in warm regions.

The synonymy of the species of this genus is in a most unsatisfactory condition; I am doubtful of the nomenclature of some here described, and the Indian materials of others, not here alluded to, are insufficient for rehable determination or descriptions.

1. P. elegans, Nees in Wight Cat. n. 1771; gl. I 9-nerved, II 7-nerved, awns of fl. gl. nearly equal about thrice as long as their gl. Wall. Cat. n. 8902; Steud. Syn. Gram. 199; Duthie Grass. N.W Ird. 35. Ischæmum papposum, Herb. Rottler. Enneapogon dipsaceus, Wall. mss. Calotheca elegans, Wight & Arn. ex Steud. l. c.

PESHAWUR, Stewart. Scind, Stocks. Mysore and the Carnatic, Heyne, Wight, &c. Burma, Wallich, &c.

Stein 3-18 in., very slender, wiry, erect or ascending from a woody often thickened base; nodes glabrous or tomentose. Leaves very narrow, flat or convolute; ligule a ridge of hairs. Panicle 1-3 in., branches very short and rachis villous. Spikelets with the awns \(\frac{1}{2}\)-\frac{1}{2}\) in, sessile and pedicelled, softly tomentose, nearly white; gl. I and II oblong-lanceolate, accuminate, I\(\frac{1}{2}\) shorter than II; awns of III and IV ciliate below the middle; keels of palea pubescent.

2. P. Aucheri, Jaub. & Spach Ill. Pl. Orient. iv. 32, t. 323; gl. I and II 7-nerved, awns of fig. gls. three to four times as long as the gl. 4 much shorter than the others. Steud. Syn. Gram 200; Duthie Grass. N.W. Ind. 35 P. turcomanioum, Trautv in Act. Hort. Petrop. i. (1871) 27. P. persicum, Steud. l.c.; Boiss Fl. Orient. v. 558; ? Edgew. in Journ. Linn. Soc. vi. (1862) 196; Aitchis. Cat. Panjab. Pl. 106. Enneapogon persicum, Boiss. Dagn. i. V. 71.

WESTERN PANJAB and MOOLTAN, Aitchison, Stewart, Edgeworth, &c. WESTERN TIBET, alt. 3-7600 ft, Clarke, Duthie, &c.—DISTEIB. Affghan., Persia, Turkestan.

Stem 6-12 in., erect or ascending, slender, puberulous. Leaves 2-8 in., narrow, flat or convolute and filtorm; sheaths smooth, or lower tomentose; ligule a pubescent ridge. Panicle 2-5 in., cylindric, silvery-yellow, with sometimes purple awms; rachis pubescent. Spikelets including the awns, \(\frac{1}{2}\)-\frac{1}{2} in. Gls. I and II narrowly hancolate, finely pubescent; II rather the longest 1II very short, villous, awns softly silky below the middle, the longer four times as long as the gl and about \(\frac{1}{2}\) longer than the intermediate; palea as in P. elegans—I am doubtful about the identification of Edgeworth's Mooltan plant, of which the only specimens I have seen are very bad, consisting of tall very slender much branched rigid stems 12-18 in. high, with long very narrow rigid leaves, and a spiciform slender flowerless panicle 6 in. long, together with a spike of very immature spikelets. It is ticketed as from the Shah Kot Hills.

3. ? P. brachystachyum, Jaub. & Spach Ill. Pl. Orient. iv. 34, t. 324; dwarf. tomentose, spike very short, gl. I and II faintly 3-5-nerved below the middle, awns of fl. gl. about twice as long as their gl., 4 shortest. Steud. Syn. Gram. 200; Boiss. Fl. Orient. v. 558. ? P arabicum, Hochst. ex Steud l.c. 199; ? Edgew. in Journ. Linn. Soc. vi. (1862) 196; Aitchis. Cat. Panjab Pl. 166; Duthie Grass. N.W. Ind. 35. ? P. nanum, Steud. l.c.; Edgew. l.c.; Aitchis. l.c.; Duthie l.c. P. vincentianum, Schmidt ex Duthie l.c. (in Syn.)

The Panjab; Multan, Edgeworth. Rajpootana; at Jodhpur, King.—Distrib. Arabia, N. Africa.

- I am very doubtful about this plant, King's specimens of which resemble a small state of *P. Aucheri*, with much shorter awas, the four shorter of which are not so short as in the figure cited of *P. brachystachyum*. Edgeworth's specimens of *P. arabicum* and *P. nanum* are insufficient for identification.
- 4. **P. robustum**, *Hook. f.*; stem stout, gls. I and II 3-nerved, awns of III nearly equal, about twice as long as their gls.

UPPER GANGETIC PLAIN; Hissar, Drummond (Herb. Duthie).

Stem 18 in.-3 ft., erect, or geniculately ascending, as thick as a crow-quill, pubescent; nodes tomentose. Leaves 6-10 by \(\frac{1}{2}\)-\(\frac{1}{2}\) in., flut; lower sheaths pubescent; ligule a ridge of hairs. Pancele 2-5 in., silvery-grey, dense-fld., cylindric. Spukelets sessile, \(\frac{1}{2}\) in. with the awns, villous; gl. I \(\frac{1}{2}\) shorter than II, ovate-lanceolate; II lanceolate; III and palea as in P. elegans, but awns shorter, and as in that species with long cilia below the middle.

## 96. ARUNDO, Linn.

Tall stout perennial grasses. Leaves flat. Spikelets few-fld. in large decompound panicles, laterally compressed, fls. mostly bisexual; rachilla jointed at the base and between the flg. gls., glabrous or shortly hairy. Glumes 6 or more, I and II subequal, empty, narrow, acute or acuminate, glabrous, scarious, persistent, 3-nerved; flg. gls. lanceolate, acuminate, or 2-fid with a short awn. 3-nerved, dorsally hairy all over below the middle; palea hyaline, 2-nerved. Lodicules 2, obovate. Stamens 3. Ovary glabrous, styles distinct, stigmas plumose. Grain oblong.—Species 6 or 7, temp. and trop.

A. Donax, Linn. Sp. Pl. 81; stem creeping below, leaf-base amplexicaul, paniele erect thyrsiform, spikelets 3-4-fld., gls. I and II oblong-lanceolate 3-nerved, tip of fig. gls. minutely 2-toothed shortly awned.

Host Gram. Austr. iv. 22, t. 38; Kunth Enum. Pl. i. 246, Suppl. 159; Reichb. Ic. Fl. Germ. t. 109; T. Nees Gen. Fl. Germ. Monocot. i. n. 36; Ledeb. Fl. Ross. iv. 394; Boiss. Fl. Orient. v. 564; Aitchis. Cat. Panjab Pl. 166; Duthie Grass. N.W. Ind. 35, Fodd. Grass. N. Ind. 60. A. bengalensis & bifaria, Retz. Obs. iv. 22, & v. 20, Roxb. Fl. Ind. 1. 347, 348; Kunth Enum Pl. i. 247. A. longifolia, Salisb Prodr. 24. A. sativa, Lamk. Fl. Fr. iii. 616. A. triflora, Roxb. Ic. Pict. t. 853. Donax arundinaceus, Beauv. Agrost. 78, t. 16, f. 4 D. benghalensis, Beauv. l. c. 78. D. bifarius, Trin. in Spreng. Neue Entdeck. ii. 73. Amphidonax bengalensis, Nees ex Steud. Syn. Gram 197; Wight Cat. n. 1748. A. bifaria, Nees ex Steud. Syn. Gram 410; Miq. Fl. Ind. Bat. iv. 410. Scolochloa arundinacea, Mert. & Koch Fl. Germ i. 529. Aira benghalensis, Gmel. Syst. i. 174.—Arundo, Wall. Cat. n. 5018, excl. F., 5020.

LOWER HIMALAYA; from Kashmir to Nepal, ascending to 3500 ft.; and from the Panjab to Silhet, the Naga Hills, alt. 5-8000 ft., and Burma. The Circars, Nilghiri, and Kurg Hills.—Distrib. Westward to Europe, N. Africa, N. Asia. Stem 6-10 ft., fistular. Leaves 1-2 ft., tapering from the base to the apex,

Stem 6-10 ft., fistular. Leaves 1-2 ft., tapering from the base to the apex, smooth, bifarious, drooping; ligule a ridge of hairs. Panicle 1-2 ft., branches scaberulous, erect or drooping. Spikelets \(\frac{1}{2}\) in., green or yellowish; gls. I and II acute or obtuse and apiculate.—A currous branched small-leaved apparently dwarf form named \(A.\) bambusyfolia, mss., was collected by Griffith on the summit of Thumathaya (Mishui Mts.), and is alluded to in his Journals, p 45, as "an Arundo festucoidea." Grisebach (in Goett Nachr (1868) 76) de-cribes a form of \(A.\) Plinuana, Turra, with the mouth of the sheath ciliate, a- a native of the Himalaya (Simla, alt. 3-9000 ft). The above character is found in Indian specimens of what I cannot distinguish from \(A.\) Donax. \(A.\) Pliniana appears to Dr. Stapt and myself to be a mere form of Donax with small r spikelets, which organs in Indian specimens vary from \(\frac{1}{4-\frac{1}{2}}\) in. The plants with the smaller spikelets are, I presume, the \(A.\) mauritanica, Poir. (a synonym of Pliniana) of Duthie Grass. N.W. Ind. 35, Fodd. Grass. N. Ind. 60.

## 97. PHRAGMITES, Trin.

Tall perennial grasses. Leaves long. Spikelets 3-7-fid in decompound panicles, not jointed on the pedicels, laterally subcompressed; rachilla jointed between the fig. gls. and above gl. III, silkily penicillate with very long hairs, not produced beyond the fi. gls. Glumes all glabrous, I and II unequal, oblong-lanceolate, 3-nerved, membranous, persistent; III much longer, narrowly oblong-lanceolate, acute, 3 nerved, male or neuter, persistent; fig. gls. subulate-lanceolate, subaristate, hyaline; palea much shorter. Lodicules 2, obtuse. Stamens 1-3. Styles 2, terminal, free, stigmas plumose. Grain oblong, terete—Species few, temp. and trop.

1. P. communis, Trin. Fund. Agrost. 134; stem 6-10 ft., and leaves withering in winter, leaf-margins rough, paniele 6-18 in. subsecund, inclined, branches not widely spreading, gl. III  $\frac{1}{3}$  in. Kunth Revis. Gram. i. 277, t. 50; Enum. Pl. i. 251, Suppl. 193; Fl. Dan. t. 2664; Reichb. Ic. Fl. Germ. t. 108; T. Nees Gen. Fl. Germ. Monocot. in. 37; Steud. Syn. Gram. 195; Franch. & Sav. Enum. Pl. Japon. ii. 170; Boiss. Fl. Orient. v. 563; Benth. Fl. Austral. vii. 636; Duthie Grass. N. W. Ind. 35, Fodd. Grass. N. Ind. 60. P. chilensis, Steud. Nom. Ed. II. ii. 234. P. Emodi, Arn. & Nees in Nov. Act. Nat. Cur. xix., Suppl. i. (1843) 174. P. hispanica, Nees l. c. P. humilis, Not. in Cat. Hort. Genuen. (1846) 27. P. longivalvis, Steud. l. c. 196. P. mauritanica, Kunth Revis. i. 80, 277, t. 50, Enum. i. 251.

P. pumila, Griseb. in Goett. Nachr. (1868) 76 (un Willk.?). P. vulgaris, Trin. Fund. Agrost. 134. Arundo graeca, Link in Linnæa, ix. (1834) 136. A maxima, Forsk. Fl. Eg. Arab. 24. A. Phragmites, Linn. Sp. Pl. 81; Host Gram. Austr. iv. 23, t. 39; Engl Bot. t. 401; Knapp Gram Britt. t. 95; Ledeb. Fl. Ross. iv. 393; Aitchis. Cat. Panjab Pl. 266. PA. tecta, Blanc. Fl. Philipp. 48. A. vulgaris, Lamk Fl. Franc. iii. 615. Czernya arundinacea, Prest Cyp. & Gram. Sicil 22.

KASHMIR LAKE, alt. 5-6000 ft., Jacquemont, &c. GARWHAL, alt. 4-5000 ft., Duthie. WESTERN TIBET, alt. 9-10,000 ft., Thomson, &c .- DISTRIB. N. and

S. temp. regions.

Stem erect from a stout creeping rootstock, leafy up to the panicle, fistular. Leaves distriction, linear to broadly lanceolate, tip subulate, base rounded, not amplexical; ligule a ridge of short hairs. Panicle usually brownish purple; branches very slender, smooth, hairy; peduncle often silkily hairy at the very base of the punicle, sometimes densely. Spikelets \( \frac{1}{2} - \frac{3}{4} \) in: gls. spreading in frt. aud exposing the long silky hairs of the rachilla, I and II longer than the fig.-Very variable; in dry situations in Tibet and Scind the stems are very short, straggling, with ovate-subulate concave rigid pungent leaves 1-2 in. long, and a reduced paniele. This starved state is the Cenchrus fiutescens, Sieb. in Bot. Zeit. ix. (1822) 14. P. pumila, Griseb., is another reduced condition of P. communis, from Tibet, in which gl. III is as short as in P. Karka. Grisebach in Goett Nachr. (1868) 76, has also var. isiaca (P. 181aca, Reichb.) as a native of Tibet. I have not seen his specimens, but neither Dr. Stapf nor I can find a valid character for this variety in European specimens.

2. P. Karka, Trin. ex Stend. Nom. Ed. ii. 324; stems very tall stout and leaves perennial, panicle \(\frac{1}{2}\)-2 ft. erect, branches widely spreading, gl. III rarely more than \frac{1}{2} in. P. Roxburghii, Steud. l. c; Nees in Nov. Act. Nat. Cur. xix, Suppl. 1. (1843) 178; Thwaites Enum. Pl. Zeyl. 370; Trim Cat. Ceyl. Pl. 109; Benth. Fl. Hongk 428; Duthie Grass, N.W. Ind. i. 35, Fodd. Grass. N. Ind. 60; Franch. & Sav. Enum Pl. Jop ii. 170; Lisboa in Journ. Bomb. Nat. Hist. Soc. vii. (1893) 378. P. bifaria, Wight Herb n. 3310. P. nepalensis, Nees ex Steud. Syn. Gram. 196. Arundo Karka, Retz. Obs. iv. 21; Roxb. Fl. Ind. i. 348. A. Roxburghii, Kunth Revis. Gram. i. 79, Enum. Pl. i. 248; Griff. Notul. iii. 47, Ic. Pl. Asiat. t. 139, f. 243. A. Roxburghiana, Kunth ex Steud. Non. l.c. A. tibialis, Roxb. Ic. Pict. (ined.), t. 854, & in Wall. Cat. n. 5017 G. A. Donax, Herb Ham. ex Wall. l. c B. A. Corea, Herb. Rottl. Oxyanthe japonica, Steud. l c. 197. Sericura japonica, Steud. in Flora, xxix. (1846) 20 Trichoon Karka, Roth. Catalect. ii. 2.—Arundo, Wall. Cat. n. 5017, 5018 F., 5019.—Arundo. Griff. l. c. 48.

Throughout INDIA; from the Panjab to Burma, and southward to Ceylon, ascending the Himalaya in hot valleys to 3000 ft -DISTRIB. Affghan, Japan, Trop. Asia,

Africa, and Australia.

Except by its greater size, larger more spreading panicle with rather smaller spikelets, more spreading glumes, and shorter gl. III, I can point out no character whereby herbarium specimens of P. Karka can be distinguished from P. communis, and none of those are constant. In both dwarf or very slender states occur with almost filiform leaves and greatly reduced panicles. Dr. Stapf, who has carefully revised my separation of the great pile of Indian specimens into the two species, is equally at a loss to point out any other characters than those given above whereby to distinguish them, except that the rachilla appears to him to be rather longer and more slender in P. Karka and the glumes hence more widely apart; and the glumes also are rather narrower. The perennial duration of the stems and leaves of P. Karka requires verification. These organs are undoubtedly annual in the northern form of P. communs, and F. Mueller observes (in a letter to Bentham) that they are so in the Tasmanian P communs; whereas in the tropical Australian plant which Bentham includes under it they are evergreen.

Var. cincta; spikelets scaberulous, pedicels villous with silky hairs. P. cincta, Clarke mss—Near Calcutta; Salt Lakes, Kurz; Mutlah, Clarke.—The specimens are in a very young state of flower. The glumes are identical with those of P. Karka, in which latter the pedicels of specimens from all parts of India are quite glabrous.

### 97\*. NEYRAUDIA, Hook, f. (Genus not in clavis).

A tall perennial leafy grass. Leaves long, flat. Spikelets small, 4-8-fld., in an effuse decompound nodding pantile, laterally compressed, lowest flg gl sometimes glabrous epaleate and neuter; rachilla shortly bearded below the flg gls., jointed at the base (above the neuter gl. if present) and between the flg. gls. Glumes all membranous, I and II unequal, empty, lanceolate, 1-nerved; flg. gls. elongate-subulate, more or less recurved, ending in a very slender tip with 2 setaceous points and a scabrid interposed awn, 3-nerved, lateral nerves submarginal, penicillate with long hairs; palea oblong, keels scaberulous. Lodicules 2, obovate or cuneate. Stamens 3, anthers long linear. Ovary shortly stipitate, oblong; styles terminal, stigmas feathery. Grain linear, terete, loose in the gl.

N. madagascariensis, Hook. f; Arundo madagascariensis, Kunth Revis. Gram. i. 273, t. 48, Enum. i. 247, Suppl. 190, Benth. Fl. Hongk. 427, Duthie Grass N.W. Ind. 35 (excl. Syn.), Fodd. Grass N. Ind. 60. A. Reynaudiana, Kunth Revis. l.c. 275, t. 49, Enum. l.c.; Steud. Syn. Gram. 194; Clarke in Journ. Linn. Soc. xxv. (1889) 89. A. Zollingeri, Buese in Mig. Pl. Jungh 243; Mig. Fl. Ind. Bat. 11. 411 Phragmites Zollingeri, Steud. in Zoll. Cat. 55, Syn. Gram. 196. Donax Thouari, Beauv. Agrost. 78, t. 16, f. 5.—Arundinacea, Griff. Notul. iii. 49, n. 6; Ic. Pl. Asiat. t. 156, f. II.—Arundo, Wall. Cat. n. 5021, 5022.

The PANJAB and TROPICAL HIMALAYA, from Chamba to Sikkim, ascending to 5000 ft. Silhet and the Khasia Hills, Assam. Penang and Burma.—Distrib

Tropical E. Asia and Malaya Trop. Africa, Madagascar.

Stem 6-8 ft (or more?) up to 1 in. diam., leafy to the panicle or near it, polished, solid, glaucous at the nodes. Leaves 1-2 ft., from filiform and convolute to 1 in. broad and flat, smooth, rather soft, margins smooth or nearly so, midrib and few nerves slender, base subamplevicual; sheaths polished; ligule a villous ridge. Pancle 1-3 ft., rachis and filiform fascicled and whorled branches smooth or subscaberulous, ultimate branchlets capillary. Spikelets 1-3 in. (including the awns), shortly pedicelled, pale brown, 4-8 fld.; gl. I and II shining, I & shorter than II; neuter gl. if present \(\frac{1}{8} - \frac{1}{5}\) in., about twice as long as I, strict, spreading, oblong-lanceolate, suberect, 3-nerved, sides convolute, quite glabrous; fig. gls. longer than the empty, more or less recurved, very slender, narrowed into the more or less recuived not twisted scaberulous awn with two bristles at its base; palea hyaline, 2-toothed, keels minutely ciliolate; callus, the upper portion of each internode of the rachilla, jointed with the latter, densely shortly bearded .- A much more elegant grass than any Indian species of Arundo or Phragmites, but like these extremely variable in habit and size, depending on place of growth. I can find no difference whatsoever between the specimens with and those without the empty gl. III; specimens with filiform leaves occur in both. Their habitats are as follows:-

1. madagascariensis proper; neuter gl. 0. Western Himalaya; from Kashmir

to Kumaon, Rangoon, Prome.—Africa, Madagascar.

2 Zollingeri; neuter gl. present. Alundo Reynaudiana, Kunth l.c.—Sikkim Himalaya, Assam, Bengal, the Khasia Hills, Chittagong, Tenasserim, Penang.—Java.

X

## 98. FINGERHUTHIA, Lehm.

Elect, rigid, annual or perennial grasses, with the habit of *Phleum. Leaves* narrow. *Spikelets* crowded in a spiciform panicle, 1-3-fid., lowest in the panicle reduced to subulate glumes, laterally compressed, jointed on the very short pedicels, lower fi bisexual or male, upper if present male, upper most an empty gl. *Glumes* I and II subequal, rigidly membranous, keeled, 1-nerved, awned; III as long as II, oblong-lanceolate, obtuse, 5 nerved, nucronate or dorsally shortly awned, palea rigid, 2-keeled. *Lodicules* 2. obcordate. *Anthers* 3. linear-oblong. *Styles* long, tree, stigmas plumose. *Grain* elliptic or oblong, free —Species 2, a S. African, and the following.

A genus of doubtful affinity, with certain characters of Alopecurus, and of Melica in the spikelets jointed on their pedicels; the imperfect basal spikelets form a sort of involucie to the spiciform panicles as in SeAleria.

F. affghanica, Boiss Fl. Orient. v. 569; spikelets 3 fld, lowest fl fem., intermediate male, upper neuter, gls I and II shortly awned keels and margins cliate. F. Atricana, Aitchis. in Journ. Linn. Soc xix. (1882) 193 (non Lehm).

Wisiern Panjab, Peshawur, alt. 3500 ft, Slewart—Distrib Afighan. Stem 12-18 m., tufted, shader, leafy. Leaves very narrow, flat, glaucous, glabrous, smooth, sheath glabrous, mouth bearded; liqule a ridge of soft hairs. Spike 3-1 m., oblong, obtuse, long-peduncled, pale green. Spikelets 3 m., closely imbricate; gls. I and II lanceolate, narrowed into straight awns as long as themselves, keels and margins ciliate with long hairs; III chartace us, mucronate, keel smooth, margins ciliate; keels of palea ciliate; IV hardly awned; V an empty gl. Gram ciliptic-oblong, acute at both ends—The only Indian epecimen is a very poor one.

## 99. ELYTROPHORUS, Beauv.

An annual erect grass. Leanes narrow, flat. Spikelets very minute, 3-5-fld., in globose sessile clusters that are densely packed along a simple rachis forming a long cylindric often lobed or interrupted spike; each cluster consists of very many densely crowded sessile compressed spikelets with awned glumes subtended by many empty glumes, not jointed at the base, rachilla smooth, jointed at the base and between the fig. gls. Glumes (of perfect spikelets), I and II subequal, empty, membranous, nucronate, keeled, 1-nerved, persistent: fig. gls. rather larger, narrowed into short awns, 3-nerved, uppermost empty; palea complicate, one or both keels winged. Lodicules 2, obliquely oblong. Anthers 1-3, minute. Styles tree, stigmas long harry. Grain obliquely oblong, teaked, free.

E. articulatus, Beaux. Agrost. 67, t. 14, f. 2; Kunth Revis Gram. 11. 481, t. 154, Lnum. Pl 1 391, Suppl 325, Thw. Enum. Pl Zeyl. 374, Trim. Cat. Ceyl. Pl. 189, Artchis. Cat. Panjab Pl 171; Wall. Cat. n. 3825; Duthie Grass. N. W. Ind. 36, Fodd. Grass. N. Ind. 61, t. 72; Lisboa in Journ. Bomb. Nat. Hist. Soc. vii. (1893) 379; Miyuel Fl. Ind. Bat. 111 400; Benth Fl. Austral. vii. 638. Echnalysium articulatum & strictum, Trim. Fund. Agrost. 142. Dactylis spicata, Willd. in Ges. Naturf. N. Schrift. iii. (1801) 416. Sesleria spicata, Spreng. Pugill. 11. 21. Eleusine calycina, Herb. Ham. ex. Wall. l. c.

From the Sutley to Bengal, Assam, the Deccan Peninsula, Burma, and

CLYLON. - DISTRIB. Trop. Asia, Africa, and Australia.

Whole plant 6-18 in. high, strict, glabrous; flowering part often longer than the rest. Leaves as long as the stem and spikes or shorter, very narrow; sheath loose; ligule obscure. Spiciform panicle 2-8 in. by  $\frac{1}{6}-\frac{1}{3}$  in. diam., pale green or white, rarely branched below. Spikelets  $\frac{1}{6}$  in., empty gls. ciliate, hyaline, nerve green; fig. gls. ovate, membranous, tips and awns scaberulous; palea hyaline, 2-fid.

#### 100. LAMARKIA, Moench.

A small annual tufted grass. Leaves flat. Spikelets dimorphic, fertile and neuter, crowded on the dropping branches of a simple secund nodding panicle, terminal spikelet of each branchlet fertile of tew gls. surrounded by empty gls., and by neuter spikelets of many obovate convolute cross gls. Fertile spikelet; glumes IV, I and II membranous, subequal, subulate-lanceolate, 1-nerved, subaristate, persistent, III shorter, ovate, convolute, dorsally awned below the 2 fld tip; IV terminating the slender rachilla, neuter, long-awned; palea of III narrow, 2-fld, 2-keeled. Lodicules very minute. Stamens 3, authers linear. Styles distinct, stigmas slender, harry. Grain elliptic-oblong, closely wrapped in the gls. and palea.

L. aurea; Moench Meth 201; Kunih Enum. Pl. i. 389, Suppl. 324; T Nees Gen. Fl. Germ. Monoc. i. n. 77; Boiss. Fl Orient v. 570; Ai chis. Cat. Panjab Pl 170; Duthie Grass. N.W. Ind. 36, Fodd. Grass. N. Ind. 61. L. Hockeriana, Griff Notul. iu. 94, Ic. Pl. Asiat. t. 143, f. 2. Chrysurus aureus. Beauv. Agrost 123, t. 22, f. 5; Reichb Ic. Fl. Germ. t. 58. C. cynosuroides, Pers. Syn. 180. Pterium elegans, Desv. Journ. Bot i. (1813) 76. Timea elegans, Garzia Rel. Acc. Zel. Act. Reale, Ann. 3-4, 24, er Parlat. Fl. Palerm. 138. Cynosuius aureus, Linn. Sp. Pl. 73; Host Gram. Austr. iii t. 4; Sibth. Fl. Graec. i. t. 79.—Gramin. Griff. Itin. Notes, 349, n. 106.

WESTERN PANJAB; Peshawar, Vicary, Stewart, Aitchison.—Distrib. Westwd. to Spain and the Cauaries.

Stem 4-8 in., stout or slender, leafy. Leaves broadly linear, acuminate; ligule oblong. Panicle 1-4 in., golden-yellow, shining; branches crowded,  $\frac{1}{4}-\frac{1}{2}$  in long, covered with fascicles of pendulous scaberulous spikelets Flowering spikelets  $\frac{1}{10}-\frac{1}{8}$  in.; awns variable in length,  $\frac{1}{8}-\frac{1}{4}$  in.—A very beautiful grass.

## 101. CYNOSURUS, Linn.

Annual or perennial tufted grasses. Leaves flat. Spikelets dimorphic, fascicled, fascicles collected in a dense unilateral spiciform terminal panicle, the 1-2 terminal of each fascicle 2-3-fld, the lower 1-2 of many neuter distichous pectinately spreading subulite glumes, persistent on an unjointed rachilla. Glumes of fertile spikelet 4-5; I and II narrow, acute or subaristate, 1-nerved; III and IV awned or mucronate, 1-3-nerved, uppermost imperfect; palea narrow, 2-toothed, keels ciliate. Lodicules 2, acuminate. Slamens 3. Styles short, free. Grain elliptic or oblong, glabrous, adherent to the gl. and palea.—Species 3-4, in N. temp. regions.

C. cristatus, Linn. Sp. Pl. 72; perennial, fertile spikelets 3-5-fld. Fl. Dan. t. 238; Host Gram. Austr. ii. t. 96; Kunth Enum. Pl. i. 388,

Suppl. 323, Engl Bot. t 316; Knapp Gram Britt. t. 64; Reichb Ic. Fl. Germ. t 7; T. Nees Fl. Germ. Monocot. 1. n 96; Beauv. Agrost. 66; Steud Syn Gram 299; Ledeb. Fl. Ross 1v. 348; Boiss. Fl. Orient. v. 570, Duthie Grass. N.W. Ind 36.

Western Himalaya; Drankar, in Piti, alt. 12-14,000 ft., Stolizha (introd.?)

-DISTRIB Europe, As. Mm. (introd. elsewhere).

Perenmal. Stem 1-2 ft., slender, simple, wiry, strict, stoloniferous, naked above. Leaves very narrow, slightly harry; ligule 2-fid. Panole 1-3 m., semi-cylindric, strict, rigid, oblong or linear, rachis flexuous. Spikelets about 11 m., the outer pectmately arranged, forming an involucie to each fascicle; fly glumes I and II oblong, scabrid above, very shortly awned; neuter gls. rigid, cuspidate, concave, scabild, pungent —I have seen no Indian specimen of this common European grass. According to Boissier its Eastern limit is the Caucasus.

### 102 KOELERIA, Pers.

Annual or perennial tufted grasses. Leaves narrow. Spikelets 2-7fld. (uppermost flg. sterile), densely crowded in subspiciform panicles, strongly laterally compressed, very shortly pedicelled; rachilla jointed between the fl. gls., and produced beyond the upper. Glumes I and II unequal, empty, persistent, keeled, acute or acuminate; fil. gls. broadly scarious, 3-5-nerved, mucronate acuminate or bind and shortly awned in the sinus; awn straight scabild; palea hyaline, 2-toothed. Lodicules 2. Stamens 3. Stigmas subsessile, plumose. Grain oblong, laterally compressed, free.—Species about 12, of N. temp regions

Sect. I. AIROCHLOA, Link. (Gen.). Perennial. Flg. glumes entire, not awned.

1 K. cristata, Pers Syn i. 97; leaves short, panicle shung, spikelets 2-4-fid. I 1-nerved, II longest, 1-3 nerved; fig. gls. acute or mucronate. Fl Dan t. 2223; Kunth Enum. Pl. 1. 381, Suppl 315; Reichb Ic. Fl. Germ. t. 93, T. Nees Gen. Fl. Germ. Monocot 1. n 64, Steud. Syn. Gram 292, Duthie Grass. NW Ind 36, Fodd. Grass N. Ind 61; Artches. Cat Punjab Pl 17(); Ledeb Fl. Ross. 1v 402; Boiss. Fl. Orient. v. 574, Benth Fl. Austral vn 639 K. glauca. DC Cat. Hort. Monsp. p. 117; Ledeb. l c. K. gracilis, Pers. l. c K. Linkii, Kunth l. c K lobata, Roem & Sch Syst. ii. 620. K. mitida, Nutt. Gen. Am 1. 74. K valesaca, Gaud in Alpina 111. 47, Agrost. 1. 149 Ana cristata, Linn. Sp. Pl. 63, Engl But. t 648, Knapp Gram Britt t 30. A glauca, Spreng. Nachtr. Bot Gart Halle, i. 10, Fl Dan. t 1566. Kunth l.c i 381. Airochloa cristata, valesiaca, pubescens, & gracilis, Link Enum Hort. Berol i 127, 128, 11. 228. Dactylis cuistata & lobata, Bieb Fl. Taur. Cauc. i 67. D. paleacea, Linn Herb. ex Munro in Journ. Linn. Soc vi. (1862) 44 Poa cristata, Withering Arr. Brit. Pl. 145, Host Grum. Austr. ii 54, t. 75 P. nitida & pyramidata, Lamk Illustr i 182, 183. Festuca cristata, Vill Hist. Pl. Dauph. ii 93. F. dactyloides, & F. glaucescens, Roth. Nov. Sp. 78.

TEMPERATE and ALPINE HIMALAYA, and WESTERN TIBET; from Kashmir to

Nepal, alt. 5-13,000 ft -DISTRIB. N. temp regions.

Densely tufted, stolomiferous. Stem 1-3 ft., slender, glabrous or pubescent. Leaves narrow, flat or involute, glabrous or the lower chate; old sheaths not lacerate; ligule obscure. Panicle 1-4 in , linear-oblong or lanceolate; branches very short, scabrid; peduncle glabrous or tomentose. Spikelets 1-1 in., shiming, green, purplish, or silvery with a green keel; gls. I and II acute, broadly hyaline, glabrous pubescent or scabrid, keel subscaberulous, rachilla scabrid; flg. gls lanceolate, acute or submucronate.—The synonymy given above includes but a few of the names given to this variable grass, the determination of the species of which would involve great labour. In India there are two prevalent forms, both common European ones, which tollowing Boissier may be thus defined

Var. tenusfolia, Boiss Fl. Orient. v. 575; stems 6-10 in., leaves very short narrow convolute, panicle 1-3 in., spikelets  $\frac{1}{2}-\frac{1}{2}$  in. green or purplish. K brevis, Ster. in Bull. Soc. Nat. Mosc. and (1857) II 110—Koeleria, Wall. Cat. n. 3792—Subalpine and alpine situations, alt. 9-13,000 it.

Var. grandylora, Boiss. l. c; leaves longer broader flat, panicles 3-5 in. white often interrupted or branched below, spikelets  $\frac{1}{5}$  in. K. glauca, Lodeb. Fl. Ross. iv. 402. K. grandiflora, Bertol. en Schult. Mant. in. 345.—Temp. regions, alt.

5500-11,000 ft.

Sect. II. LOPHOCOLEA, Reichb. (Gen.). Annual. Flg. glumes 2-fiJ, awned.

2 K. phleoides, Pers. Syn. i. 97; leaves soft flat glabrous or hairy on the margins and towards the base, panicle cylindric pale or dull green lobulate or not, spikelets 3-7-fld, gl. I and II unequal acute or aristately acuminate glabrous pubescent or hirsute, fig. gls 2-fid awned in the sinus, awn 4-3 as long as the gl. rarely longer. Kunth Enum. Pl. i. 383, Suppl 317, t 28, f. 1, Steud. Syn. Gram. 294, Ledeb Fl. Ross iv 403, Boiss, Fl. Orient. v. 572; Duthie Grass. N. W. Ind. 36, Fodd. Grass. N. Ind 61; Aitchis. Cat. Panjab. Pl. 170; Benth. Fl. Austral. vn 639. K. berythea, Boss. & Bl. Duagn. Ser. II. 1v. 135 K brachystachya, DC. Uat. Hort. Monsp 120. K. custata, Bertol. Amoen. Ital. 67. K. dactyloides, Spreng. Syst. 332. K. Figarei, de Notar. in Ann Sc. Nat. Ser. III. ix. (1848) 325. K. obtusiflora, Boiss. I c. I. vii 131. K. trapezuntina, C. Koch in Linnæa, xxi. (1848) 396. Festuca cristata, Linn. Sp. Pl. 76. F. phleoides, Vill. Fl. Delph. 7, Hist. Pl. Delph. ii. 95, t. 2; Host Gram. Austr 111 t. 21. Lophochloa phleoides, Reichb. Fl. Germ. Excurs. 42, Ic. Fl. Germ. 73; T. Nees Gen. Fl. Germ. Monocot. 1. n. 63 Wilhelmsia caucasica, C. Koch in Linnæa, xxi. (1848) 400. Dactylis caudata, & cylindracea, Brot. Fl. Lusit. i. 99, 100. D. pungens, Hornem. Enum. Hort. Hafn. ex Kunth (1804) 9. D. spicata, Brot. ex Spreng. Syst. 1. 332 Trisetum phleoides, Trin in Mem. Acad. Petersb. Ser. VI. i. (1831) 65. Poa phleoides, Lamk Illustr. i. 182. Bromus alopecuroides, Lagasc. Gen. & Sp. Nov 4. B. dactyloides, Roth Nov. Sp 60. Rostraria pubescens, Trin Fund. Agrost. 149.

PLAINS of the PANJAB, from Lahore westwards. The SALT BANGE, &c. KASHMIR, Clarke.—DISTRIB. Westwal to the Atlantic. (Australia, introd.)

Stems 6-12 in., erect or ascending. Leaves as long or shorter, erect, acuminate; sheaths smooth; ligule short, truncate. Panicle \(\frac{1}{2}\)-3 in., by \(\frac{1}{2}\)-1 in. diam., sometimes lobed or branched at the base. Spikelets \(\frac{1}{2}\)-1 in., hardy shning, gls. I and II unequal, shorter than the flg, keels scabrid or smooth; I oblong-lanceolate, 1-nerved; II longer, oblong, acuminate, 3-nerved; flg. gls. elliptic-oblong, 5-nerved, at length tubercled, awn short or long, rachilla harry. —A variable plant in the glumes, of which Boissier has 4 varieties. As with K. cristata, I have confined the synonyms of K. phleoides to those I am pretty sure of. Probably a dozen others might be cited.

3. K. argentea, Griseb. in Goett. Nachr. (1868) 77; leaves flat glabrous, panicle interrupted elongate, spikelets 2-3-fld. silvery white

glabrous shining, tip of gl. I 2-toothed, awn of fig. gl. very short dorsal above the middle of the gl.

Western Tiber, and Kishtwar, alt. 10-13,000 ft., Falconer, Thomson, &c. Stem 12-18 in., tufted, tomentose below the panicle. Leaves 3-5 in., very narrow, glabrous, flat or convolute; ligule short, lacerate. Panicle 1½-3½ in., rachis tomentose. Spikelets ½ in., shining, gls. I and II subequal or I rather the shortest, both 1-nerved; rachilla laxly villous; awn of flg. gls. a little exceeding the gl. itself

#### 103. CATABROSA, Beauv. (by O. Stapf).

Perennial soft grasses, stem erect or creeping below; innovations extra-vaginal. Leaves flat. Spikelets very small, 2- (rarely 3-4)- fld., loosely panieled, oblong or obcome, awnless, subarticulate on their pedicels; rachilla jointed at the base, produced beyond the flg. gl. Glumes 4 or more, uppermost usually imperfect; I and II very unequal, hyaline, empty, persistent, 0-3-nerved; I obtuse or truncate; II broadly obcuneate or orbicular; III and IV longer than II, broadly cuneate or flabelliform, 3-5-nerved, truncate, crenate; palen as long as the gl, very broad, keels smooth, glabrous or hairy. Lodicules 2, minute, fleshy. Stamens 3. Stammas subsessile, feathery. Grain obovate or oblong, free, glabrous.— Species 10-12, natives of cold or temperate regions.

Under Phippsia (p. 240), I indicated the affinity of that genus with Colpodium, and a further examination of the Indian plants referred to the latter, suggested to me the possibility of these, together with Dapontia, forming one genus. I accordingly drew Di. Stapf's attention to the group, and requested him to give me his opinion. This he has done, confirming my hypothesis and drawing up a systematic account of the Indian species to be included under Catabrosa. As to Phippia algida, the solitary arctic type of that genus, it differs from the other plants of the Colpodium group in the emity gls. being minute or obsolete, and may hence be considered as forming a section by itself, whilst P himalaica, with larger empty gls., enters that of Colpodium. The position of Catabrosa is after Poa, replacing 119. Colpodium in the Key to the Genera.

- § 1. Catabrosa proper. Empty gls. almost nerveless; flg. gls. strongly 3-nerved, rarely with 2 intermediate fainter nerves.—Aquatic or subaquatic plants, rooting at the lower nodes, and with usually long creeping or ascending branched stolons.
- 1. C. aquatica, Beauv. Agrost. 97, t. 19, f. 8; stem compressed, leaves linear obtuse, panicle oblong or pyramidal, lower branches at length deflexed, spikelets 2 rarely 3-fld, gl. III erose, nerves subpercurrent. Kunth Enum. Pl. i. 369, Suppl 306, t 25, f. 1; Ledeb. Fl. Ross. iv. 387; T Nees Gen. Fl. Germ. Monoc. i. n. 58; Boiss Fl. Orient. v. 576. f. C. trigida, Phil. Fl. Alac 55 C. ochroleuca, Guss. Fl. Sic. Syn. i. 100; Dumort. Obs. Gram. Belg. 108. Aira aquatica, Linin Sp. Pl. 64; Fl. Dan. t. 381; Host Gram. Austr. ii. t 41, Engl. Bot. t. 1557; Knapp. Gram. Britt. t. 29. Colpodium aquaticum, Trin. Fund. Agrost. 136. Glyceria airoides, Reichb. in Moessl. Handb. Ed. II. iii 1827, Ic. Fl. Germ. t 78. G. aquatica, J. & C. Presl. Fl. Cech. 25 (non Wahlb.); Steud. Syn. Gram. 286. Molinia, aquatica, Wibel Prim. Fl. Werth. 116. Poa airoides, Koel Descr. Gram. 194.

BRITISH BELUCEISTAN; Quetta (Duthre).—DISIRIB. N. Temp. and Arctic regions.

Stem 6-24 in., erect from the creeping sometimes floating base, sheathed nearly up to the panucle; stolons creeping or ascending, branches long or short. Leaves 1-6 by  $\frac{1}{6}-\frac{1}{3}$  in., linear, obtuse, flat, subflaced, smooth; sheaths tight, smooth, of young branches closed to near the mouth but easily split to the base; ligule ovate or truncate, hyaline. Panicle up to 8 in., open, loose, rachis smooth, lower branches 5-10-nate, slender, very unequal, subscaberulous, the longer 4 in., branching; lateral pedicels very short. Spikelets pale green or yellowish, rarely purple; rachilla smooth; gls. very thin broad and obtuse; I about  $\frac{1}{3}$  in., nerveless or 1-nerved, II  $\frac{1}{6}$  in , 1-sub-3-nerved; fl gls. nearly  $\frac{1}{10}$  in., obvorate to broadly oblong, truncate, shortly hairly below; palea broad, very obtuse, keels harry below. Lodicules obliquely ovate. Anthers  $\frac{1}{20}$  in. Grain  $\frac{1}{10}$  in, oblong, subject at both ends or top rounded, laterally subcompressed, hilum punctiform—I have seen no Indian specimens, but am informed by Mr. Duthie that his was named by Hackel.

Var augusta, Stapf, dwarf, tufted, with or without stolons, panicle narrow contracted, branches very short, gls. I and II nerveless or nearly so, fig. gls. \frac{1}{15} - \frac{1}{14} in. C. aquatica, Duthre Grass N W. Ind. 36.—Western Tibet; Land Pass,

alt. 15-16,000 it., Thomson.

2. **C. sikkimensis**, Stapf, stem short, stolons long, leaves  $\frac{1}{2}$ -1 in., panicle  $1\frac{1}{2}$  in. narrow loose, branches 2-nate subsimple, spikelets  $\frac{1}{10}$  in. 2-fld, gl. I minute, fig. gls. 5-nerved, nerves ending below the hyaline margin, lateral rather strong.

ALPINE SIKKIM; alt. 17,000 ft., Gammie.

Stem up to 6 in , prostrate or ascending; sto'ons with short fascicles of few short complicate leaves. Spikelets dark purple, variegated with yellow; gl. I up to  $\frac{1}{50}$  in. nerveless, broadly ovate to oblong, II up to  $\frac{1}{30}$  in., broader, sub-1-nerved; flg. gls.  $\frac{1}{14}$  in , truncate, erose, glabrous; palea broad, very obtuse, keels smooth.—The specimens are very scanty, and have all the appearance of being reduced forms, growing on wet soil on the upper limits of vegetation. Specimens from a lower altitude may require modification of the above characters.

- § 2. COLPODIUM, Trin. (Gen.). Empty gls. 1-3-nerved; flg. gls. 5-3-nerved, nerves faint, lateral short, intermediate often suppressed or represented by a single spiral vessel.
  - \* Empty gls. about half as long as the flg.
- 3. **C. himalaica**, Stapf; paniele erect spiciform dense-fld., spikelets  $\frac{1}{10}$  in. 1-2-fld. Colpodium subspicatum, Hack. mss. Phippsia himalaica, Hook. f. ante, p. 240. Vilfa, sp. 2, Herb. Strachey & Winterb.

From Kashmir to Kumaon, alt. 13-14,500 ft.

Stems 3-8 in, tuited, erect, smooth, nodes 1-2 Leaves complicate or the cauline flat; sheaths tight, closed almost to the mouth, ligule very shoot. Panicle continuous or interrupted; rachis and branches smooth. Spikelets obvoid to oblong, rachilla glabious; gls. very thin, nerves obscure; I very shootly 1-nerved; II with short obscure side-nerves; III with very short obscure side-nerves, keel and nerves shortly hairy; keels of palea ciliate. Lodicules connate at the base. Grain ellipticoblong, compressed.—For further description see p. 240. Duthie's n. 12,160 has more acute empty glumes with sometimes crose margins, but does not otherwise differ.

4. **C. Thomsoni,** Hook f; panicle erect open lax-fld., spikelets  $\frac{1}{9}-\frac{1}{6}$  in 2-4-fld.

WESTERN TIBET; Nubra Valley, alt. 10-11,000 ft., Thomson.

Stems 4-6 in., tufted, very slender, erect, smooth, nodes 3-5. Leaves  $\frac{1}{2}$ - $\frac{13}{4}$  in., linear, acute, flat, few-nerved; sheaths closed to  $\frac{1}{10}$ - $\frac{1}{3}$  in. of the mouth, thin, tight;

ligule broadly ovate, rounded Panicle 1 in., ovate, erect, rachis smooth; branches spreading or defleved, filiform, with few spikelets; lateral pedicels very short. Spikelets oblong, pile green; rachilla smooth, tip setiform; gls. thin, obtuse, I 1-nerved, II longer with 2 short lateral nerves; III 5-nerved, lateral nerves very funt and keel hairy; palea 2-fid, keels with long hairs. Anthers oblong. Lodicules counate near the base. Grain obliquely oblong, compressed.

5. **C. nutans,** Stapf; panicle open or contracted flaccid, spikelets \(\frac{1}{2}\)-\frac{1}{2} in. 2-5-fld. Colpodium nutans, Griseb, in Guett Nuchr. (1868) 76. Graphaphorum nutans, Munro ex Duthie Grass, N.W. Ind 41.

ALPINE HIMALAYA, from Kushmir to Garwhil, alt 10-14,000 ft., Jacquemont, &c.

Stems 12-18 in , tufted, erect, smooth, nodes 2-3 Leaves very variable in length and breadth, up to 6 in. by \( \frac{1}{2} \) in , flat flaced, many-nerved; sheaths of innovations closed nearly to the mouth; liquid \( \frac{1}{2} \) in. Panicle 2-5 in., nodding or flexuous; rachis smooth; branches subcapillary, lowest 2-3-nate, sparingly divided beyond the middle; lateral pedicels half as long or as long as the spikelets. Spikelets broadly obovate, variegated, rachilla glabrous; gls. very broad, thin, obtuse and crose; I1-3-nerved. II longer, \( \frac{1}{10} \) in., with 2 short lateral nerves, III obovate, 3-5-nerved, lateral nerves very short, all hairy, keels of palea hairy. Lodicules lanceolate, connate near the base. \( \\_ \leftilde{Intheis} \) linear. Grain oblong, subterete, with a shallow ventral groove

- \*\* Empty gls. as long as the flg. or longer. Dupontia, Br. (Gen )
- 6. **C. Wallichii**, *Hool f*; panicle subracemose few-fld, spikelets  $\frac{1}{10}$  in 1-2-fld Gramin, *Wall Cut.* n. S907.

NEPAL, Walluh. SIKKIM; Kankola Pass, alt. 14-15,000 ft , J D II.

Stem 6-18 m, from a shortly creeping base, slender or rather stout, smooth, nodes 1-2 Leaves 1-3 m, narrowly linear or filtform, lighle  $\frac{1}{10}$  m, oblong, obtuse Panicle 1-2 m, very narrow, usually reduced to a few-fid. Laceme, erect; tachts smooth; branches with 1-3 spikelets, capillary, flevious Spikelets pendulous, green or purplish; rachilla with a settform tip; gls. very thin, obtuse; I oblong 1-3-nerved; II broader, more obtuse, 3-nerves, ide-nerves reaching about the middle; III broadly elliptic-oblong, 5-nerved, inner side-nerved very faint, glabious or nearly so, outer and keel shortly harry, keels of palea ciliate. Lodicules lanceolate, connate to the middle or below it. Anthers linear-oblong. Grain oblong, compressed—The Sikkim specimens have somewhat smaller and paler spikelets than the Nepalese.

# 104. ERAGROSTIS, Beaur (by O. Stapf.)

Annual or perennial grasses. Stem erect or geniculately ascending, very rarely prostrate. Leaves narrow. Spikelets many- (rarely 1-2-) fld., in open or contracted paincles, rarely in simple spikes, not articulate at the base (except E. cynosuroides), usually strongly laterally compressed; rachilla firm or subarticulate between the flg. glumes, not produced beyond the uppermost gl Glumes many, broad, obtuse acute or mucronate, never awned, dorsally rounded and keeled; I and II much shorter than the spikelet, equal or unequal, empty, persistent or separately deciduous, 1-nerved cr II 3-nerved, flg. glumes imbricating, at length deciduous from the rachilla, 3-nerved, all bisexual or the uppermost and rarely the lowest imperfect; palea broad, membranous, deciduous with its gl. or persistent ou the rachilla, keels 2 ciliate scabrid or smooth. Lodicules 2, very minute. Stamens 2 or 3. Ovary glabrous; styles 2, stigmas

plumose. Gram minute, globose oblong ovoid or obovoid, free in the gl. and palea.—Species about 100, of warm countries.

The Asiatic and African species of this very difficult genus have been studied by Dr. Stapf, to whom I owe the classification and diagnoses of the Indian. With regard to their synonymy, and the citation of authorities, we have together endeavoured to determine these, but from the want of authentically named specimens of the species described by Roxburgh (under Poa) and by older authors, and of those enumerated in more recent works, we cannot hope to have attained complete accuracy in these respects.—J. D. H.

- A. Spikelets panicled; panicle open contracted or spiciform.—Species 1-23.
- Sect. I. CATACUASTOS. Rachilla of spilelets more or less jointed, and breaking up from above downwards—Species 1-7.
- \* Panicle spiciform, rachis bearded at the nodes; margins of flg. glumes ciliate.
- 1. **E. phleoides,** Stapf, perennial, panicle compact subclavate, spikelets  $\frac{1}{3}-\frac{1}{4}$  by  $\frac{1}{12}-\frac{1}{3}$  in 12- or fewer fid. fig. gls. mucronate, keels of palea long-ciliate. Dactylis phleoides, Klein ex. Steud. Nom. Ed. II. 1. 478. D. phleoides & spicata, Herb. Heyne ev. Wall. Cat. n. 5015.— Eragrostoides, Wall l c.

SOUTHERN INDIA, Heync.

- Stems 1-3 ft, densely tufted, erect or geniculately ascending, very slender. Leaves 3-5 in , linear-lanceolate, finely accuminate, spreading, flat, glabrous, base rounded; sheath bearded close below the mouth; ligule a few hairs. Panicle 1-3 in. by  $\frac{1}{3}-\frac{2}{3}$  in. diam., pale, inther shining; bianches very short, villous at the nodes. Spikelets moderately compressed; gls. I and II subequal, acute; fig. gls.  $\frac{1}{10}-\frac{1}{8}$  in, membranous, minutely scaberulous; nerves slender, prominent; palea  $\frac{1}{3}$  shorter than its gl. Anthers  $\frac{1}{30}$  in. Grain  $\frac{1}{100}-\frac{1}{20}$  in., elongate-ellipsoid.
- 2. **E. ciliata,** Nees Agrost. Bras. 512, perennial, panicle cylindric compact, spikelets  $\frac{1}{10}$  - $\frac{1}{6}$  in. or smaller much compressed 6-12-fid, fig. gls. cuspidately acuminate, keels of palea long-ciliate. Wight Cat. n. 1788; Steud. Syn. Gram 265; Dalz & Gibs Bomb. Fl. 298. E. rupestris, Steud. l c. Poa ciliata, Roxb. Fl. Ind. 1. 334. P. cylindrica, Herb Heyne & incurvata, Rottl. ex Wall Cat. n. 5014. P. duplo-ciliaris, Roxb Ic. Pict. aned t. 831. P. rupestris, Roth. Nov. Pl. Sp. 71.—Eragrostid. Wall l c.

BOMBAY, at Domus, Dalz. & Gubs. CHOTA NAGPORE, Clarke. SOUTHERN

INDIA, Heyne.-DISTRIB. Cochin China.

Stems 2-4 ft., erect or geniculately ascending from a nodose base clothed with hard sheaths, smooth Leases linear-lanceolate, finely acuminate, widely spreading, flat or convolute, rarely  $\frac{1}{4}$  in. broad, smooth, glabrous; sheath bearded close below the mouth; ligule a few hairs. Panicle 2-3 by  $\frac{1}{3}$  in. diam.; branchlets hirsute. Gls. I and II acute, cilite; flg gls  $\frac{1}{10} - \frac{1}{8}$  in., membranous or subhvaline, number scaberulous, nerves prominent; palea  $\frac{1}{3}$  shorter than its gl. Anthers about  $\frac{1}{16} - \frac{1}{5}$  in. Grain ovoid to ellipsoid,  $\frac{1}{30}$  in., terete.—I have not seen Bombay specimens

3. **E. coarctata**, Stapf.; perennial, panicle elongate subspiciform often lobed or lax-fid., spikelets  $\frac{1}{12} - \frac{1}{6}$  by  $\frac{1}{24}$  in., slightly compressed 5-10-fid., fig. gls. obtuse, keels of palea long-ciliate. E. cylindrica, Aitch. Cat Panjab Pl. 169 (non Steud.).—Eragrostis, Wall. Cat. n. 5003 (in part).

From the Uppir Gangetic Plain, Moradabad, Thomson, to Sikkim, Behar, Chittagong, Arracan and Buema. Central Provinces & Chota Nagpore, Clarke

Stems in small or large tufts, 4-18 in. high, geniculately ascending from a nodose branched stock, base clothed with short hard sheaths. Leaves linear, spreading horizontally, more or less convolute, finely acuminate, glabrous, sometimes flat and  $\frac{1}{4}$  in. broad, quite smooth, glaucous; sheath rather tight, smooth, bearded below the mouth; ligule very short. Panicle 2-6 in by  $\frac{1}{2} \cdot \frac{2}{1}$ , in. broad, sometimes very narrowly pyrama al, white, branches hispid; gls. I and II subequal; flg. gls  $\frac{1}{10}$  in, membranoue, nerves prominent. Anther  $s \cdot \frac{1}{10}$  in. Gram shortly ovoid,  $\frac{1}{30}$  in.—Dwarf states 2-3 in. high occur; and tall ones 2-3 ft. high from the Sikkim Tenai and Arracan, with leaves  $\frac{1}{2}$  in. broad and a long lax narrow panicle 6 in, long.

- \*\* Panicle open or more or less contracted or spiciform; margins of flg. gls. eciliate.
- 4. **E. aspera**, Nees Fl. Afr Austr. 408; annual, panicle large thyrsitoim, at length expanding, branches and pedicels long, spikelets linear-oblong  $\frac{1}{5}$  by  $\frac{1}{24}$  in. erect 4-16-fld, empty gls. subequal, flg. gls. obtuse nerves prominent, keels of palea scaberulous, stamens 3. Lisboa in Journ. Bomb. Nat. Hist. Soc. vii. (1893) 386. E. tenella, Nees in Wight Cat. n. 1783 (non Linn. nec Benth.). E. paniculata, Steud Syn Gram. 278. Poa aspera, Jacq Hort. Vind. ii. 32. P. paniculata, Roxb. Fl. Ind i 340.—Eragrostis, Wall. Cat. n. 3841.

Southern India; Dindygul, Wight. BANGALORE, Puchle (Ic. in Herb. Kew),

N. and S. CONCAN, Les' oa .- DISTRIB. Afr. trop Isle of France.

Stem with the long panicle 2-4 ft., stout, subcrect, branched, smooth Leaves 8-18 in , flat, keeled, smooth; sheath villously bearded; ligule of long hairs Panicle 10-20 in. by 4-6 broad, oblong to obovate-oblong, rachis scatberulous, bearded at the nodes with long white hurs; branches solitary or pseudo-whorled, capillary, divided from the base or nearly so, subcrect; pedicels much longer than the small, rather scattered spikelets Flg gls. hardly  $\frac{1}{10}$  in.; palea obscurely 3-lobed, lobes very obtuse, keels scabiid. Anthers  $\frac{1}{10}$  in. Grain subglobose, about  $\frac{1}{30}$  in.—Panicle quite unlike that of any other Indian species.

5. **E. ciliaris,** Link Enum. Hort. Berol. i. 192; annual, panicle spiciform rarely open, branches and pedicels very short glabrous, spikelets about  $\frac{1}{10}$  in. long and broad 6-12-fld strongly compressed, empty gls subequal acute, flg gls. widely spieading mucrounlate, lateral nerves submarginal, keels of palea very long-ciliate, stamens 3

PLAINS of N and S. INDIA (not in Ceylon) .- DISTRIB. Reg. trop.

Stem 1-2 ft, procumbent below and geniculately ascending, slender. Leaves very narrow, flat; mouths of sheath with very long hairs. Panicle 3-6 in., interrupted or lobed below, appearing hairy from the long cilia of the pulea, branches very short (except var. Clarkei) divided from the base, glabrous; nodes of glabrous rachin naked. Spikelets very pale, as broad as long, much compressed; fig. gls. subhyaline, scalerulous, often slightly recurred and elegantly distichous; rachilla of spikelet persistent. Anthers 110 in. Grain elongate ovoid, about  $\frac{1}{100}$  in.

Var. ciliaris proper, Stapf; panicle spiciform more or less lobed of interrupted. E. ciliaris, Boiss Fl. Orant. v. 582; Baler Fl. Maurit. 456; Duthie Grass N.W. Ind. 37, Fodd. Grass. N. Ind. 62; Aitchis Cat. Panjab. Pl. 169; Lisboa in Journ. Bomb. Nat. Hist. Soc. vii. (1893) 386; Griseb Fl. Brit. W. Ind. 532. E. lobata, Trin. in Mem. Acad. Petersb. Ser. VI. i. (1811) 396. E. lepida, Hochst. ew A. Ruh. Tent. Fl. Abyss. ii. 424. E. plumosa, Boiss. Fl. Orient. v. 582 (ewcl. Sym.).; Benth. Fl. Hongk. 431. E. pulchella, Parl. in Hook. Niger Flor. 186. Mega-

stachya ciliaris, Beauv. Agrost. 74 — Eragrostis, Wall. Cat. n. 5009, 5003 (in part).—N. India from the Panjab to Burma.—Westwd. to trop. Africa and America. Var. brachystachya, Boss. Fl. Orient. v. 582; panucle short compact evlindric. E. arabica, Jaub. & Spach Ill. Pl. Orient. 1v. 31, t. 322. E. riparia, Nees in Herb. Royle—Upper Gangetic Plain, Scind & the Concan.—Arabia, Afr. trop. Vai. Clarke, Stapf; panicle open as in E. tenella.—Delhi. Clarke.

6. **E. tenella**, Roem. & Sch. Syst. ii. 576 (excl.  $\beta$ ) (non aliorum); panicle variable, spikelets  $\frac{1}{20-6}$  in. by  $\frac{1}{21}$  in. broad or less, not strongly compressed 3-9-fld, empty gls. subequal or unequal, flg. gls. oblique not mucronate lateral nerves remote from the margins, keels of palea usually obscurely ciliate, stamens 3, grain ovoid.

Throughout India, in the plains and lower hills, from the Panjab to Malacca and Ceylon. The Nicobar Islds.—Distrib. Trop. Asia, Africa.

Very variable, from 6-18 in, high, stems usually slender, many from the root and densely tufted. Leaves narrow. Paniele 2-8 in, long, contracted or spreading, pale green or purplish, excessively branched, oblong ovate or cylindric, never with the long interrupted tachis and pseudo-verticillate branches of E interrupta.

Vai. plumosa, Stapf; panicle open often flexuous branches capillary nodes bearded, spikelets  $\frac{1}{15}$  in long- or short-pedicelled 3-9-fld, empty gls. unequal I  $\frac{1}{3}$ - $\frac{1}{5}$  shorter than II, rachilla subarticulate, fig. gls.  $\frac{1}{30}$  in., anthers very minute, grain ovoid about  $\frac{1}{30}$  in. E. despiciens, Schult. Mant. ii. 318. E. elegantula, Nees 8, Wujit Cat. n. 1781b. E. laxa, Buker Fl Maunt. 456. E. plumosa, Link Enum. Hort. Berol. ii. 192 (non Boiss.); Wight Cat. n. 1786; Thw. Enum. Pl. Zeyl. 373; Trim. Cat. Ceyl. Pl. 109; Duthre Grass. N.W. Ind. 38, Fodd. Grass. N. Ind. 64, t. 38, 77; Artchis. Cat. Panjab Pl. 170; Lisboa in Journ Bomb. Nat. Hist. Soc. vii. (1893) 335. E. tenella, Roem. & Sch. l. c.; Stewl. Syn. Gram. 266. Poa anabilis, Linn. Sp. Pl. 68. P. capillaris, Roab. Ic. Put. ined. t. 837. P. despiciens, Link Enum. Hort. Berol. i. 88. P. hir-uta, Herb. Rottl. P. plumosa, Retz. Obs. iv. 20, Kunth Enum. Pl. 1. 338; Roxb. Fl. Ind. i. 337. P. tenella, Linn. l. c. 69. Burn. Fl. Zeyl. t. 47, f. 3); Retz. Obs. v. 19; Kunth Rev. Gram. ii. 467, t. 147, Enum. Pl. i. 338, Suppl. 294.—Eiagrostis, Wall. Cat. ii. 5007.—Throughout India, Burma & Ceylon (C.P. 926, 70).

Var riparia, Stapf; panicle contracted very narrow flaccid, rachis glabrous, branches subfilitorm or capillary, spikelets as in var. plumosa, empty gls. unequal I = \frac{1}{3}\ \text{shorter than II}, \frac{1}{16}\ \text{gls.}\frac{1}{25}\ \text{in.}\, anthers about \frac{1}{16}\ \text{in.}\, grain \frac{1}{30}\ \text{in.}\ order \text{order}\ order \text{in.}\ order \text{order}\ order \text{fin.}\ order \text{order}\ order \text{fin.}\ order \text{order}\ or

Var. viscosa, Stapf; stem and rachis of panicle b. low viscid, panicle stiff stouter with firmer more strongly nerved glumes than in vars plumosa & riparia, oblong to linear open contracted or compact, branches filiform often very short, nodes glabrous or obscurely bearded, spikelets few-16-fid. often purplish, empty gls subequal or I slightly shorter, fl. gls  $\frac{1}{35}$ - $\frac{1}{15}$  in , anthers about  $\frac{1}{100}$  in , grain ovoid  $\frac{1}{100}$ - $\frac{1}{100}$  in.—Subvai. a, aperia, Stapf, panicle oblong or pyramidal open, branches distinctly lengthened. E. viscosa, Trin. in Mem. Acad. Petersb. Ser. VI. i. (1831) 397; Wight Cat. n. 1785; Lisboa in Journ. Bomb. Nat. Hist. Soc. vii. (1893) 386. Poa ciliaris, Roxb. Ic pict. ined. t. 832, 856. Herb. Madr. Wall. Cat. n. 5008 A. P. glumosa, Herb. Roxb. P. plumosa & malabalica, Herb. Hegne ex Wall. Cat. n. 5008 C. D. E. P. Telphulia, Heb. Him. ex Wall. Cat. n. 5008 B. P. viscosa, Retz. Obs. iv. 20; Roxb. Fl. Ind. 1.336; Grah. Cat. Bomb. Pl. 236, Kunth Enum. Pl. 1. 336.—Eragrost. Wall. Cat. n. 5008, 5010.—From the Gangetic Plains & Bombay

southwd.—Tiop. & S. Africa.—Subvar. B. lassantha, Stapf, stem 21 ft erect branched, nerves of fl. gls ciliate E. terebinthacea, Kurz mss - Pegu, Kurz Burma, Collett. -Subvar. y. contracta, Stapf; panicle compact spiciform lobed or interrupted, branches very short E. mangalonca, Hochst ex Steud. Syn. Gram. 265. E. viscosa, B. minor, Nees in Wight. Cat. n. 2359, ? E. viscosa, Dalz & Gibs. Bomb. Fl 298. Poa incurva, Herb. Rottl. (in pait) - Deccan Peninsula.

Var. breviculius, Stapf; stems 1-3 in. usually ascending from a prostrate base, panicle 1-1; in, by 3-4 lines broad oblong to ovate-oblong rather dense but not compact, rachis bearded or not, empty gls. subequal, fig. gls.  $\frac{1}{21}$  in., anthers  $\frac{1}{110}$   $\frac{1}{120}$  in.

or less, grain -1 in. - From the Panjab to Behar and Central India.

7. E. interrupta, Beaur. Agrost. 71 (non Roem. & Sch nec Trin.); panicle very variable usually stiff interrupted, spikelets 12-4 in. ovate to linear few or many-fld, flg gls. obtuse nerves slender, keels of palea scaberulous, stamens 2, grain obovoid.

Throughout India, BURNA, CEYLON. - DISTRIB. Mesopot., Afr. trop.

Very variable, from 2-6 in. high with slender stems and ovate panicle to 3 ft. high and branched with the stem as thick as a small goose-quill, and a panicle 1-2 ft. long either contracted with appressed branches or interrupted with many tiers of rather short spreading subwhorled branches. Spikelets usually very minute, from 10 in. with 2-3 fig. gls to about \(\frac{1}{4}\) in. with many fig. gls., green or pale brown, rarely coloured.

Var. Koenigii, Stapf; panicle long narrow with short dense pseudowhorls, spikelets shortly pedicelled usually 6-14-fid, fig. gls.  $\sqrt{3}-\sqrt{2}_6$  in. or less. E. Koenigii, Link Enum. Hort. Bird in. 294; Steud Syn. Gram. 266. E hapalantha, Trin. in Mem. Acad. Petersb. Ser. VI. 1. (1839) 409 (in part). E minutiflora, Presl Rel Hænk. i. 274 (excl. Syn.); Lisboa in Journ Bomb. Nat Hist. Soc. vii. (1893) 386 E mossulen-is, Steud. l c. 264 E. nutans, Nees. in Wight Cat. n 1776 . Steud. Nom. Ed. II. i 563; Duthie Grass. N. W. Iid. 38, Fodd. Grass. N. Ind. 63, t 76, Aitches. Cat Panjab Pl. 169; Lisboa l c. 331; Boss. Fl. Orient v. 583 E. Rothi, Steud. Syn. Gram. 267. E. stricta, Steud. l c. 264. E. verticillata, Nees. in Wight Cat. n. 1784. Pon Corana, & P. diandra, Herb. Ham. ex Wall. Cat. n 3850 F. D. P. interrupta, Lamk Ill. 1. 185; Pois Encycl v. 87, Heyne ex Roth, Nov Sp. 67; Koen. ex Roxb. Fl. Ind i. 335. P. Koenigi, Kunth Enum. Pl. i. 346. P. latifolia, Wall. Cat n 5001 E. P. nutans, Koen. ex Roth Nov. Sv. 64; Rorb. Fl Ind. 335 (non Retz). - Engrostis, Wall Cat. n. 3850 A D.E. - I. 5005, 5006 .- All India. Ceylon, Trimen. Eastwd. to Egypt As. and Afr. trop.

Var. diarrhena, Stapf, panicle long linear-oblong, branches 1-2 in. hardly who led simple at the base, spikelets 10-14-fid, fig. gl., with E. diandra, Artchi. Cat. Panjab Pl. 169 (non Steud.); Duthie Grass. N. W. Ind 37; Griseb. in Goett. Nachr. (1868) 76. E. diarrhena, Steud. Syn. Gram. 266. Poa duandra, Roxb. Fl. Ind. i. 336 (non Br.). P. diunhena, Schult. Mant. 616.—Eragrostis, Wall. Cat. n. 3850 K L, 5002. 5004—Sumore, Bengal, Mysore, Carnatic.

Var. diplacknoides, Stapf; stem tall stout branched, panicle long effuse or contracted fluccid, branches solitary or 2-3 in a whorl elongate simple or if branched the whoil rarely overtopped by 1 or 2 branches 2-5 in. long, ultimate branches not divaricate, spikelets 6-12-fid., fig. gls very obtuse rarely 1 m. E. diplach-noides & Hochstetteri, Steud. Syn. Gram 268 E nutans, Thw. Enum. Pl Zeyl. 373; Trim. Cat. Ceyl Pl 109. Diplachne elongata & powforms, Hockst. ex Steud. l. c - Central India, eastwd. to Afr. trop , Clarke, Duthre. Ceylon, Walker, Thuartes (CP. 933 (in part) 3259.

Var. tenussima, Stapf; panicle long loose narrow usually stiff, branches 1-2 in. pseudo-whorled spreading ramified from the base, branchlets and pedicels divariente filiform to capillary, spikelets few-fid., fl. gls. very obtuse  $\frac{1}{3}$  m. E. aurea, Sleud. Syn. Gram. 267. E. caudata, Nees ex Steud. l. c. 264; Duthie Grass. N.W. Ind 37. E. japonica, Trin. in Mem. Acad. Petersb. Ser. VI. i. (1831) 405. E. tenella 8, Roem. & Sch. Syst. ii. 356. E. tenella, Benth. Fl. Hongk. 431: FL.

Austral viii 643 (non Beauv); Duthre Fodd. Grass. N. Ind. 65, t. 78. E. tenellula, Steud. Syn. Gram. 279. E tenussima, Schrad ex Nees Fl. Afr. Austr. 409, 410. Pon japonica, Thunb. Fl. Jap. 31. P. hyemalis, Laka, & speciosa, Herb. Ham. ex Wall. Cat. n. 3850 C. B. P. tenella, Br. Prodr. 181 (non Beauv.); Roxb. Fl. Ind. 1. 337, Ic. Pict ined t. 837. P. tenella, Kunth Enum. Pl. 1. 338.—Eragrostis, Wall. Cat. n. 3850 B. C. H. 5001 A—D—Temp. & trop Hunal, from the Panjab eastwd. and southwd. to Ceylon; ascends the Himalaya to 7000 ft.—Trop. As.

- Sect. II. Pteroessa. Rachilla of spikelet tough, persistent; fig. glumes falling away from its base upwards.—Species 8-24.
- \* Spikelets always flat, usually elliptic-ovate to oblong; lateral nerves of flg. gls. very prominent, straight, almost percurrent; paleæ deciduous with their glumes.
- 8. E. amabilis, Wight & Arn. ex Nees in Hook. & Arn. Bot. Beech. Voy. 251 (excl. Syn. Linn.) annual, panicle oblong or ovoid-oblong open or contracted, branches solitary ramifying from near the base, spikelets \$\frac{1}{6-\frac{1}{2}}\$ in ovate rarely oblong or linear-oblong up to 50-fld, empty gls. subequal acute 1-nerved, flg. gls. very close set distichously spreading broadly elliptic shortly acuminate, palea elliptic keels winged scabrid. Wight Cat. n. 1777; Wall. Cat. n. 3838; Nees in Act Acad. Nat Cur. xix Suppl i (1843) 205 E. polymorpha, Trin. ex Steud Nom. Ed. II. 1. 364, 562 E. rubens, Hochst. ev Miq. Analect. Bot. ii. 26; Steud Syn Gram 265. E. unioloides, Nees ex Steud. l. c. 264; Thic. Enum Pt. Zeyl. 373; Trim. Cat. Ceyl. Pl 109; Duthie Grass. N W. Ind. 38, Fodd. Grass. N Ind. 65; Aitchis. Cat. Panjub Pl. 170, Lisboa in Journ Bomb Nat. Hist Soc. vii. (1893) 383, Griseb. in Goett. Nuchr. (1808) 76. Poa amabilis, Herb Rottl (non Linn) P. muluflora, Roxb. Fl Ind. i. 333 P. polymorpha, Br. Prodr 180. P. pseudamabilis, Roxb Ic Pict ined t. 843 P. rubens, Lamk Illustr i 184, t. 45, f. 2; Kunth Enum. Pl. 1 335. P. unioloides, Retz Obs. v. 19; Roxb. Fl. Ind. 1. 330; Kunth l. c.; Grah. Cat. Bomb. Pl. 236. Briza rubra, Lamk. Ill. 1 187; Kunth l. c. 371 Uniola indica, Spreng. Syst i 349; Dalz. & Gibs Bomb Fl 298. Megastachya polymorpha, Beauv. Agrost. 74.

PLAINS OF INDIA and LOWER HIMALAYA, from Kashmir (ascending to 6000 ft.), eastwd. to Burma and southwd. to CEYLON (CP. n. 930).—DISTRIB. As. top. Stem 6-18 m., rather slender. Leaves usually short, flat; mouth of sheaths naked. Panucle 2-4 m., branches filiform, not very numerous or long, raches and nodes glabrous. Spikelets broad or narrow, pale or pumphsh; nachilla tough. internodes very short,  $\frac{1}{100}$  m.; empty gls  $\frac{1}{15}-\frac{1}{20}$  m 1-nerved; flg. gls. nearly  $\frac{1}{12}$  m. long, nucronulate; palea  $\frac{1}{5}-\frac{1}{6}$  shorter than its gl. Stamens 3, anthers  $\frac{1}{100}-\frac{1}{20}$  m. Grain obovoid or chipsoid, laterally compressed, about  $\frac{1}{3}$  by  $\frac{1}{6}$  m.

- \*\* Spikelets usually linear or linear-oblong, less compressed and with less prominent nerves than in \*, or if strongly compressed and nerved then with persistent pileas.
- † Spikelets more or less fascicled on the primary or secondary branches or shortly pedicelled in narrower racemes.
- 9. **E. malayana**, Stapf; annual, panicle ovoid, branches solitary at length spreading flowering to the base, pedicels as long as the spikelets or shorter, spikelets  $\frac{1}{10}-\frac{1}{3}$  in linear-oblong 10-30-fld., rachilla almost straight internodes very short, gls. all broad closely imbricate, sides

convex, empty gls unequal broadly ovate acute, fig. gls. ovate shortly acuminate keel curved, keels of palea scaberulous.

PERAK, Wran. MALACCA, Hervey .- DISTRIB. Borneo, Binca.

Stems densely tuited, 10-18 m., erect or generalately ascending, very slender. Leaves 2-3 in , very narrow, strict, finely acuminate, convolute; mouth of sheath with long hairs. Paniele 2-3 m, open or contracted, branches ramified from near the base, branchlets short contracted filiform, rachis glabrous. Spikelets slightly compressed, rachilla tough; gl. I  $\frac{1}{28}$  in; II  $\frac{1}{24}$  in; flg gls.  $\frac{1}{25}$  in., mucronulate, lateral nerves inconspicuous; palea obovate-oblong, rather shorter than its gl, keels narrow. Grain  $\frac{1}{310}$  in, ovoid or ellipsoid, slightly laterally compressed.

10. E. stenophylla, Hochst ex Miquel Analect. Bot. Ind. ii. 27; branches of panicle much ramified from above the base, pedicels short filiform, spikelets \( \frac{1}{1-\frac{1}{3}} \) in linear 30-40-fid, rachilla zigzag, empty gls. subequal subacute 1-nerved, fig. gls. ovate acute sides convex, keel curved, palea caducous with the gl. keels scabrid. Lisboa in Journ. Bomb. Nat. Hist. Soc vii. (1893) 385 E. Brownei, Nees in Wight Cat. n. 1780 partim (non Steud). E. elegantula, Nees l.c. 1781, a, β (non Steud); Duthie Grass. N. W. Ind. 37, Fodd. Grass. N. Ind. 63, t. 74. E. gangetica, Steud. Syn Gram 266. E. ovina, Nees ex Steud. l. c. 268. PE. Willdenovii, Steud. Aom Ed. II. i. 565. P. amabilis & nutans, Herb. Heyne ex Wall. Cat. n. 3847 A. Poa amabilis, Herb. Rotil. (non Linn.). P. atroviridis, Herb. Ham. ex Wall. Cat. n. 3844 partim (non Desf.). P. gangetica, Roxb. Fl. Ind. i. 340. P. nutans, Retz. Obs. iv 19 (non Roxb.); Thivaites Enum. Pl. Zeyl. 373. P. procera, Hb. Wight ex Wall Cat. n. 3831 C. P. ovina, A. Rich. Tent. Fl. Abyss. n. 428. P. viscosa, var. Wall. l. c. n. 3831—Eragrosiis, Wall Cat. n. 3030 A, 3831 B. C. D. 3832 A. (in part) 3043 E., 3844, 3847.

Throughout India and Burma. Ceylon, Thwaites (CP. 925, 932).—DISTRIB. Trop. Asia and Africa.

Annual or subpriennial. Stems many, densely tifted, 12-18 in. high, geniculately ascending. Leaves rather short, smooth, usually strict and convolute; sheaths smooth. Panule ovate or oblong or sublinear, subflevuose, inclined; branches rather distant, alternate, obliquely spreading when ripe, ramifications short, contracted. Spikelets crowded, blue grey, tachilla tough; gl.  $1\frac{1}{3}$ , in; II  $\frac{1}{2}$ , in or shorter; flg. gls.  $\frac{1}{17}$  to  $\frac{1}{20}$  in. or more, lateral nerves slender; palea rather shorter than its gl., gently cuved. Stamens 3, authers minute about  $\frac{1}{120}$   $\frac{1}{100}$  in. Grain about  $\frac{1}{100}$  in., globosely oblong to subglobose.

11. E. elegantula, Steud. Syn. Gram. 266 (non Nees); perennial, panicle oblong, branches solitary short, pedicels very short, spikelets \( \frac{1}{2} \) in. linear to linear-oblong 8-30-fid., rachilla tough, empty gls. subequal acute 1-nerved, fig. gls. ovate acute sides convex, palea caducous with the gls. keels scabrid Griseb. in Goett Nachr. (1868) 75; Lisboa in Journ. Bomb. Nat Hist Soc. vii. (1893) 384. E Brownei, Nees ex Wight Cat. n. 1780; Aitchis Cat. Panjab. Pl 169; Duthie Grass. N.W. Ind. 36, Fodd Grass. N. Ind. 62 E. luzoniensis, Steud. Lc. 266. Poa; atroviridis, Ham. ex Wall Cat. n. 3843 A. P. convoluta, Heyne in Herb. Rottl.; Wall Cut. n. :831 E. P. Charris, Schult. Mant. 1. 314. P. diandra & cernna, Herb. Wight ex Wall. Cat. n. 3843 B. C. P. distans & laevis, Hb. Heyne ex Wall. l.c. n. 3840. P. elegantula, Kunth Revis. Gram. i. 340, Enum. Pl. 1. 346. P elegans, Roxb. Fl. Ind 1 338. P. viscosa, var. Herb. Heyne in Wall. Cat. 3831 A.—Eragrost. Wall. Cat. n. 3830 B. C., 3831 A, 3832 B, 3833, 3840, 3843, 3845 A (in part).

Throughout INDIA, BURMA and CEYLON (Wallich, Gardner).

Stem fall, 1-3 ft, suberect from a spreading base, usually stout and branching, but sometimes slender and short, smooth. Leaves few, short, smooth, flat or sub-on-volute; mouth of sheath bearded. Panacle nodding, branches rather distint, spriading, 1 aunifying from above the base, sometimes abbreviated and the spikeless clustered on the rachus, rachis glabious. Spikelets purplish or green; empty gls.  $\frac{1}{2}$ ; in; flg. gls  $\frac{1}{13}$ - $\frac{1}{14}$  in., lateral nerves slender; internoles of rachill  $\frac{1}{70}$ - $\frac{1}{70}$  in; palea rather shorter than its gls. Stamens 3, anthers about  $\frac{1}{2}$  in  $\frac{1}{2}$  in  $\frac{1}{2}$  by  $\frac{1}{70}$ - $\frac{1}{10}$  in.

12 E. elongata, Jacq. Eclog Gram 3, t. 3; perennal, paniele verv variable, branches usually simple, spikelets very shortly pedicelled rather crowded subparallel linear  $\frac{1}{6} - \frac{1}{10}$  in. 10-25-fld, rachilla rather stout, empty gls. ovate-lanceolate acute,  $\frac{1}{6}$  1-nerved,  $\frac{1}{6}$  11 1-3-nerved, flg. gls. ovate-lanceolate very acute nearly flat, keel almost straight, palea strongly curved. keels very stout scabrid. E. bahiensis, Hance in Journ. Lann. Soc. xiii. (1873) 136, Griseb. in Goett. Nachr. (1868) 76 (non Schrad). E. Browneana. Nees in Nov. Act. Nat. Cur. xix Suppl. i. (1843) 205 E. Browni, Nees Il. Afr. Austr 396; Steud. Syn. Gram. 279; Thimatics Enum Pl Zeyl 373; Trim. Cat Ceyl. Pl. 109; Benth. Fl. Hongk. 432, Fl. Austral vii. C46 (m. part). E. Cumingii, Steud. l. c. 266. E. interrupta, Steud l. c. 279 (non Beauv). E. orientalis, Nees in Nov Act. l. c. 206, Thw. l. c. 373, Trim. l. c. 109. E. pubescens. Steud. l. c. E. Willdenoviana. Nees in Hook. & Arn. Bot. Beech Voy. 252. E. zeylanica. Nees & Mey. in Nov. Act. l. c. 204: Thwastes l. c.; Trim. l. c. Poa Brownei, Kunth Revis. Gram. i. 112, Enum. Pl. i. 333. f. P. dependens, Hornen. Enum. Hort. Hafn Suppl. 2. P. elongata. Willd. Enum. Hort. Berol. i. 108; Kunth Enum. i. 384. P. interrupta & polymorpha, Br. Prodr. 180. P. pulchella, Wall. mss. Megastachya elongata & polymorpha, Beauv. Agrost. 74, 167.—Eragrost. Wall. Cat. n. 3836, 3845 (m. part)

LOWIR BENGAL, CHITTAGONG, BURMA, the NICOBAR ISLDS, and CEYLON (C.P.

931, 3047, 3251) -Distrib Asia trop, Malaya, Australia, N. Caledon.

Stems tufted, stiff, tall or short, stout or slender, simple or branched. Leaves narrow, strict, flat or convolute; mouth of sheath beauded. Panicle obling or ovate, with solitary distant spreading filterin branches, or from the shortening of these subspiciform, rachis glabrous. Spikelets acute, dark brown or reddish; gl. I  $\frac{1}{10}$  in., II  $\frac{1}{17}$  in.; flg. gls. usually  $\frac{1}{11}$  in., firm, literal nerves rather prominent; rachilla rather stout, internodes  $\frac{1}{10}$  in ; palea  $\frac{1}{3}-\frac{1}{6}$  shorter than its gl. Authers  $\frac{1}{100}-\frac{1}{00}$  in. in the Indian specimens. Grain ovoid to subglobose,  $\frac{1}{10}$  in.

- †† Spikelets not fascicled, usually more or less divaricate when lipe.
- § Spikelets  $\frac{1}{12}$ - $\frac{1}{4}$  in. broad, flg. gls. broad, more or less obtuse,  $\frac{1}{16}$ - $\frac{1}{10}$  in. long, lateral nerves strong.—Inhaals.
- 13. **E. barbulata**, Stapf.; leaf-marg:ns eglandular, panicle oblong very loose, branches solitary, pedicels very slender, spikelets few  $\frac{1}{3} \frac{2}{3}$  in ovate-oblong or linear narrowed upwards 10-25-fid., empty gls. subequal ovate obtuse, iachilla stout nodes bearded, fl. gls. close-set very broadly ovate obtuse, palea broadly ovate persistent keels scabrid, grain subglobose. —Eragrostis, Wall. Cat. n. 3839.

LOWER BURMA; road to the Petroleum Wells, Wallich.

Annual, erect, 3-4 ft. high, branched. Leaves 12-18 in., up to \(\frac{1}{4}\) in. broad, usually very narrow, subconvolute, and sheaths pubescent or villous below the middle. Panicle 6-12 in.; nodes of tachis welly at the axils, branches very

distant, scaberulous, spreading, flexuous, simple at the base; pedicels as long or longer than the pale obve-green spikelets. Gl. I 1-nerved, II 1-3-nerved; rachilla tough, internodes about  $\frac{1}{10}-\frac{1}{10}$  in.; flg. gls.  $\frac{1}{10}$  in , nerves strong. Stamens 3; authers linear, about  $\frac{1}{10}$  in. Grain  $\frac{1}{30}$  in. long  $-\Lambda$  stately species.

14. **E. tremula**, Hochst ex Steud Syn. Gram. 269; leaf-margins eglandular, panicle large ovate very loose branches solitary, pedicels very slender, spikelets versatile 1 in. or more linear narrowed upwards 10-70-fld., empty gls. subequal subobtuse, rachilla tough glabrous, fig. gls. close-set very broadly ovate subobtuse, palea obovate-oblong persistent keels scabrid, grain globose. Duthie Fodd Grass. N. Ind. 65, t. 79, Lieboa in Journ. Bomb. Nat. Hist Soc vii (1893) 382; Boiss. Fl. Orient. v. 581. E. multiflora, Trin. in Mem. Acad. Petersh. Ser. VI. i. (1841) 401; Dalz. & Gibs. Bomb. Fl. 298; Duthie Grass. N.W. Ind. 38; Artchis. Cat Panjab Pl. 169. E. rhachitucha, Hochst ex Miquel Analect. Bot. Ind. 11. 25. Poacurvata, Hb. Heyne ex Wall. Cat. n. 3849. P. multiflora, Roch. Fl. Ind. i. 338 (non Forsk.). P tremula, Lamk. Illust. i. 185; Kunth. l. c. 332.— Eragrost. Wall. Cat. l. c.

Northern India; from the PANJAB to BUNGAL and BURMA, and southward to

the CARNATIC .- DISTRIB. Affghan , Atrica trop

Annual. Stems densely tufted, subcrect, 6-24 in., leafy chiefly at the sometimes hardened base. Leaves few, short, very narrow; mouth of sheath slightly harry. Panicle often as long as the rest of the plant and 8 in. broad, nodding; achis glabrous, axis bearded, branchlets and pedicels roughish; pedicels longer or shorter than the spikelets which are pale green or purplish. Empty gls.  $\frac{1}{10}$   $\frac{1}{10}$  in., herves strong; palea a little shorter than its gl. Stamens 3, anthers  $\frac{1}{100}$  in. Grain hardly  $\frac{1}{10}$  in, dain.

15. E. major, Host. Gram. Austr. iv. 14, t. 24; leaf-margins (in Indian specimens) glandular, panicle oblong to ovate oblong stiff, branches subsolitary spreading, pedicels very short, spikelets  $\frac{1}{6}$  in ovate-oblong or linear few to 50-fld., empty gls. ovate acute, rachilla tough, fig. gls. broadly ovate subacute, palea broadly obovate much curved, keels scabrid oi ciliolate, grain globose. E. flexuosa, Steud. Syn. Gram. 266; Duthie Grass. N. W. Ind. 37. E. megastachya, Link Enum. Hort. Berol. 1. 187; Kunth Enum. Pl. i 333; Reichb. Ic. Fl. Germ. t. 91; Wight Cat. n. 1778; Thwaites Enum. Pl Zeyl. 373; Trim. Cat. Ceyl. Pl. 109; Aitchis. Cat. Panjub Pl. 169, Duthie Grass. N.W. Ind. 38, Fodd. Grass N. Ind. 63, t. 75; Lisboa in Journ. Bomb. Nat. Hist. Soc. vii. (1893) 382, Ledeb. Fl. Ross. 1v. 382; Boiss Fl. Orient. v. 580. E. multiflora, Aschers. ex Boiss. 1 c. E poaeoides, Trin. in Mem. Acad. Petersb. Ser. VI. i. (1831) 404. E vulgaris var. megastachya, Coss. et Dur. Fl. Alger. 148 Poa cilianensis, All Fl. Pedem. 11. 246, t. 91, t. 2. P. elegans, Herb. Wight & Herb Ham. c.r Wall. Cat. n. 3828 C. D. P. Eragrostis, Cav. Ic i 63, t 92; Sibth. Fl. Grac. t. 73. P. flexuosa, Roxb. Fl Ind. i. 339. P. multiflora, Forsk Fl. £g. 1rab. 21. P. polymorpha, Koen. ex Wall. l. c. n. 3828 A. P. Roxburghiana, Schult. Mant. ii. 315. P. subsecunda, Herb. Ham ex Wall. l. c. n. 3828 D. P. tortuosa, Spieng. Syst. Veg. 1. 345. Megastachya Eragrostis, Beauv. Agrost. 74. Briza Eragrostis, Linu. Sp. Pl. 70; Schreb. Besch. Gras ii. 74. B. oblonga, Moench. Meth. 185.—Eragiostis, Wall. Uat. n. 3828, 3837.

Throughout the Plains and lower Hills of India and Burma, ascending to 5200 ft. in the Himalaya. Ceylon, (C.P. 3163).—Distrib. Westward to S. Europe, Asia trop. and subtrop.

Annual. Stem 1-2 ft., usually stout and branched, but very variable. Leaves flat, smooth, flaccid, narrow, rarely  $\frac{1}{4}$  in. broad; sheath sparingly bearded. Panicle 2-8 in., sometimes contracted, rachis glabrous, branches stiff or flexuous, namifying from or near the base. Spikelets slightly narrowed upwards, dark olive-grey; Gl. I, 1- or sub-1-3-nerved, II 3-nerved; flg. gls.  $\frac{1}{1.2}$  in., uppermost usually empty and smaller, nerves strong; palea  $\frac{1}{4}-\frac{1}{2}$  shorter than its gl. Anthers about  $\frac{1}{60}$  in. Grain  $\frac{1}{10}-\frac{1}{3}$  in, loose within the tuigid gl.

- §§ Spikelets  $\frac{1}{6}$   $\frac{1}{3}$  in.; fl gls. less than  $\frac{1}{16}$  in. or if longer then narrower and more or less acute.
- ‡ Panicle rather stiff, branches and lateral pedicels usually short lateral nerves of flg. gls. strong.—Leaf-margins often glandular.
- 16 E. minor, Host Gram. Austr iv. 15, Fl Austr 1 135; leaf-margins glandular, panicle ovate or oblong rather stiff, branches solitary capillary ramifying from near the base, pedicels short, spikelets ½-⅓ in. linear to ovate up to 12-fid., empty gls subequal acute 1-neived, fig. gls. broadly ovate obtuse. grain globose or ellipsoid-globose dorsally convex E poaeformis, Innk Hort. Berol 1. 188; Reichb. Ic. Fl. Germ t. 91, T. Nees Gen. Fl. Germ Monocot. n. 1. 55. E poaeoides, Beauw Agrost. 76; Griseb. in Goett Nachr (1868) 74; Duthie Grass. N.W. Ind 38, Fodd. Grass. N. Ind. 65; Atchis. Cat. Panjab Pl. 170; Lisboa in Journ. Bomb. Nat Hist. Soc. vii. (1893) 387; Ledeb. Fl Ross. iv. 380; Boiss. Fl. Orient. v 580. E. poaeoides β, Trin. in Mem. Acad. Petersb. Ser. VI. 1. (1831) 404. Poa Eragrostis, Linn. Sp. Pl 68 (rn part); Kunth Enum. Pl 1. 332; Schreb. Beschr. Græs ii. t. 38; Host Gram. Austr. ii. 50, t 69 Briza Eragrostis, Vill. Fl Delph. ii. 50 (non Linn.).

PLAINS of NORTHERN INDIA, ascending the Himalaya to 8000 ft, from the Panjab eastwards to Bengal. The Concan, Jacquemont, &c. Western Tiber; Ladak, alt 12-13,000 ft., Thomson.—Distrib. Westward to S. Europe, N. Asia.

Annual. Stems 6-18 in., densely tufted, slender. Leares rather short, flat; mouth of sheath slightly bearded. Panuce 2-6 in., rachis glabrous, branches spreading when ripe. Spikelets pale green to dark purplish or olive-grey, glistening; rachilla tough; gls. I and II  $\frac{1}{25}$ ,  $\frac{1}{10}$  in, keel scabrid, flg. gls.  $\frac{1}{16}$  rarely  $\frac{1}{25}$ ,  $\frac{1}{12}$ , in., lateral nerves strong; palea  $\frac{1}{6}$  shorter than its gl., obovate-oblong, keels scabrid or subchlate Stamens 3, anthers  $\frac{1}{100}$  in. Grain  $\frac{1}{20}$  in. or more, dorsally rounded or slightly flattened.—The glands are a very constant character. A single Bombay specimen is eglandular, but placed here from its strong resemblance to glandulaterous specimens also from Bombay. The Tibetan specimens are very small, 1-6 in. high.

17. **E. Rottleri**, Stapf; leaf-margins eglandular, mouth of sheath naked, panicle oblong open rather stiff, branches solutary or lower geminate ramifying from near the base, pedicels of lateral spikelets very short, spikelets  $\frac{1}{6} - \frac{1}{16}$  in. linear 6-12-fld, empty gls subequal, rachilla tough, flg. gls. oblong subacute, palea persistent, grain terete. E. viscosa, Wight Herb. propr. n. 1785, in part. Poa pauciflora, Herb. Rottl.

The CARNATIC; at Tranquebar, Heyne, Rottler, Wight.

Leaves 1-7 in , flat or more or less convolute. Pancle 2-6 in., rachis naked, branches filiform to capillary. Spikelets pale brown or white; empty gls. about  $\frac{1}{15}$  in : fig. gls  $\frac{1}{15}$   $\frac{1}{20}$  in., lateral nerves strong; palea rather shorter than its gl., keels scaberulous. Stamens 3, anthers about  $\frac{1}{100}$  in. Grain  $\frac{1}{50}$  in.—Rottler's P. paucyfora is a tall form with few spikelets. Wight's specimen has the stem viscid VOL VII

below the panicle as in *E. tenella* var. mscosa, with certain forms of which *P. Rottleri* has much in common. The persistent rachilla with deciduous glumes of *E. Rottleii* are as in *E. minor*, as are the scabrid not ciliate keels of the palea.

18. **E. Willdenoviana**, Nees in Wight Cat n. 1779 (non in Nov. Act. Nat Cur. xix. Suppl. i (1843) 205), leaf-margins rarely glandular, paniele short ovate stiff open, branches solitary capillary, pedicels short, spikelets  $\frac{1}{6-\frac{1}{4}}$  in by  $\frac{1}{25}$  in linear pale up to 25-fld, empty gls. very unequal, I minute hyaline nerveless, fl. gls. broadly elliptic acute, palea oblong persistent, grain truncate at both ends dorsally grooved. E. poaeoides, Trim. Cat Ceyl Pl 109, Herb Ind. Or H. f & T (the Carnatic plant) Pouglabia & lewis, Rottl. mss. P. P. polymorpha, Koen. ex. Rottl in Schrift Naturf Fr Berl. iv. (1803) 194.—Eragrostis, Wall Cat. n. 3848

MYSORE, Rottler, Heyne; Dindygul, Wight. CEYLON; Trincomalee, Glenie

(C.P. 3944).

Annual Stems 4-18 in., very slender, smooth, rigid, erect or geniculately ascending Leaves short, flat, narrow, erect, rather rigid; mouth of sheath naked Panicle 1-3 in., branches spreading when ripe, ramifying from near the base; pedicels (except sometimes the terminal) shorter than the spikelets. Spikelets olivegrey or greenish; gl. I  $\frac{1}{100}\frac{1}{30}$  in; II ovate, acute,  $\frac{1}{2}\frac{1}{10}$ , In., 1-nerved; flg gls.  $\frac{1}{15}\frac{1}{20}$  in., lateral nerves strong; palea  $\frac{1}{6}\frac{1}{4}$  shorter than its gl., keels scaberulous. Stamens 3, anthers about  $\frac{1}{100}$  in. Grain oblong,  $\frac{1}{30}\frac{1}{00}$  in., dorsally flattened and grooved.—This may prove to be E. polymorpha, Roem. & Sch. Syst. ii 575. Rottler's specimen was named P. polymorpha, but that name was crossed out and replaced by P. glabra, Nob E. Willdenoviana, Nees in Hook. & Arn. Bot. Beech. Voy. (of China) is E. elongata.

- ‡‡. Panicle very loose, ramifications very slender often flexuous or flaccid; lateral nerves of flg. gls. usually faint —Leaves eglandular.
- 19 **E. tenuifolia**, Hochst. in Flora, xxiv. (1841) 1. Intell. 20, name only; ex Steud Syn Gram. 268; perennial, panicle oblong to ovate very open. rachis glabrous, branches solitary or 2-nate distant, spikelets  ${}^2-1^1_x$  in. by  $\frac{1}{2}$  in linear 5-15-fid., empty gls. very unequal, I minute hyaline, rachilla tough, fl gls. ovate acute, subacute or apiculate, palea  $\frac{1}{3}$  shorter than its gl. strongly curved persistent, grain obovate-oblong. E collocarpa, K. Schum in Engl. Pflanzenw. Deutsch-Ost Afr. C. 114. ? E. mucronata, Roem. & Sch. Syst. 11. 577 E. parviglumis, Hochst. ex Steud. l.c. 267. Poa tenuitolia, A. Rich. Tent. Fl. Abyss. 11. 425.

NILGHIRI HILLS, Hohenacker. Belgaum, Ritchie; Satpura Hills, Thompson.

—Distrib Africa trop

- Stem 2-3 ft, erect, slender, branched. Leaves long, very narrow; mouth of sheath naked Pancele 3-5 in.; branches ramifying from near the base and branchets rather distant, spieading, filtform, stiff, shorter than in E. nigra. Spikelets olive-grey; gl I  $\frac{1}{10}$   $\frac{1}{10}$   $\frac{1}{10}$  line nerveless, II iemote from I, about  $\frac{1}{30}$  in., ovate, subacute, nerveless or faintly 1-nerved; fig gls  $\frac{1}{12}$  in., keels of palea scabiid. Stamens 3, anthers  $\frac{1}{23}$  in. Grain  $\frac{1}{12}$  in , slightly compressed, dorsally grooved.
- 20. **E. papposa**, Steud Nom. Ed. II. 1. 564; perennial, panicle ovoid very delicate lax open sparingly branched, rachis glabrous, branches solitary rarely 2-nate branchlets stiff divancate, pedicels long capillary, spikelets  $\frac{1}{3}$  in linear 7-23-fld, empty gls. subequal or I shorter hyaline, rachilla tough, fig. gls. bioadly ovate margins above hyaline, palea obtuse denticulate persistent, grain obovoid. Willk. & Lange Prodr. Fl. Hispan. 1. 83; Griseb. in Goett. Nuchr. (1868) 75. E. atro-virens, Lange in Koebj.

Vedinsk Meddel. (1860) 47 (non Def). E rigiditoha, Hochst. Herb. Mem. Div. Forsk. (nomen) E. speirostachya, Coss. et Dur ex Lange l.c. E. verticillata, Coss. ex Lange l.c. (non Cav.). E. vulgaris, var speirostachya, Coss. et Dur Fl. Alger. 148 Poa nigra, Clem ex Willk & Lange Prodr. Fl. Hisp. 1.83. P. papposa, Desf. in Roem. & Sch. Syst. ii. 585. Megastachya? papposa, Roem. & Sch. l.c

N.-EASTERN PANJAB; common in the Trans-Indus districts; Rawul Pudi, &c., Stewart, Astchison —Distrib. Westward to Arabia, N Africa, and Spain.

Stem 12-18 in, very slender, simple. Leaves short, strict, very narrow, convolute; mouth of sheath bearded with long silky hairs Panu le 4-8 in; rachis filiform; branches spreading, alternate, almost capillary, naked below, loosely branched beyond the middle with capillary spreading branchets. Spikelets very pale yellow or dark or pale olive-grey; gl. I  $\frac{1}{3}$ ,  $\frac{1}{-25}$  in. or less, nerveless; II  $\frac{1}{25}$ ,  $\frac{1}{-20}$  in, taintly 1-nerved, fl.: gls about  $\frac{1}{17}$  in: palea rather shorter, keels scabiid. Stamens 3, anthers  $\frac{1}{100}$  in  $Grain \frac{1}{50}$  in, dorsally grooved.—A very elegant species, with usually quite pale very narrow spikelets.

21. E. pilosa, Beauv. Agrost 71; annual, panicle oblong to pyramidal flaccid open or contracted, rachis glabrous or hairy, branches usually more or less whorled and branchlets very slender, pedicels longer or shorter than the spikelets which are  $\frac{1}{5}$  in. linear 5-12-fid., empty gls. unequal hyaline, rachilla tough, fig gls ovate acute, palea subpersistent keels scaberulous, grain ellipsoid. Reichb. Ic Fl Germ. t. 91; T Nees Gen. Fl Germ. Monocot i. n. 55, Thw. Enum. Pl Zeyl 373; Trim Ca' Ceyl. Pl. 209; Wight Cat n. 1784, 1784b., Duthie Grass. N.W. Ind. 38, Fodd. Grass. N. Ind. 64; Artchrs. Cat. Panjab Pl 170; Lisboa in Journ. Bomb. Nat. Hist. Soc. vii (1893) 381, Ledeb. Fl. Ross. iv. 382; Boiss. Fl. Orient v. 881; Benth Fl Hongk. 432, Fl. Austral. vii. 645; Baker Fl Maurit. 455; Griseb. Fl Brit. W. Ind. 532. E. elegantula, a, Nees in Wight Cut n. 1782. E indica, Steud. Syn. Gram. 264. E. parviflora. Trin in Mem Acad. Petersb. Ser. VI. i. (1831) 411. E. pellucida, Steud. l. c. 279. E. punctata, Link. ex Steud. Nom. Ed. II. i. 561, Syn. Gram. 264. E. verticillata, Roem. & Sch. Syst ii. 575; Reichb. Ic. Fl. Germ. t. 9; Aitchis. Cat. Panjab Pl. 170. Poa amabilis, Herb. Heyne ex Wall. Cat. n. 3829 B. P. indica, Koen. ex Rottl. in Ges. Naturf. Fr Berl. Neue Schrift. iv. (1803) 194 P nutans, Herb. Wight ex Wall Cut n. 3829 D. P. parviflora & pellucida, Br. Prodr. 180. P. Phullica, Herb. Ham. ex Wall. 1. c. 3829 C. & 5012 (Phulcia) P. pilosa, Linn. Sp Pl 68; Host Grum. Austr. ii. 168, t. 68; Kunth l. c. 329. P. punctata, Linn. f. Suppl 109; Kunth Enum. Pl i. 330, Roxb. Fl. Ind. 1. 338. P. tenella, Herb. Heyne ex Wall. l.c. 3829 B. P. verticillata, Cav. Ic. 1. 63, t. 93; Kunth Enum. 329. Milium tenerum, Herb. Heyne ex Wall l.c. 3829 B.—Eragrostis, Wall. Cat. n. 3829.

Throughout India and Burma; ascending the Himalaya to 5000 ft. or more. Ceylon; common (C.P. 929).—DISTRIB. S. Europe and most warm countries.

Stem 3 in.-3 ft., tufted, erect, usually very slender and simple, rarely stout and branched. Leaves short, narrow flaccid or strict and convolute, rarely elongate; mouth of sheath bearded. Panicle very variable in size and form, erect inclined or nodding; rachis hairy or not at the nodes; branches filtform or capillary, fascicled or sub-whorled, simple below, lower sometimes 6 in. long. Spikelets usually grey tipped with purple; empty gls. nerveloss or II faintly 1-nerved; fig. gls.  $\frac{1}{10} - \frac{1}{5}$  in. Stamens 3, anthers  $\frac{1}{60}$  in., violet. Grain  $\frac{1}{13} - \frac{1}{15}$  in., base laterally apiculate.— Dwarf specimens 2-4 in. high look very different from the ordinary state of the plant

22. E. nigra, Nees ex Steud. Nom. Ed. II. i. 563, Syn. Gram. 267; perennial, basal sheaths narrow terete or obscurely compressed, panicle oblong to ovate large open lax-fld., branches usually many in whorls or fascicles rarely solitary or geminate, spikelets up to  $\frac{1}{6}$  in. linear to oblong 3-9-fld, empty gls. subequal acuminate strongly 1-nerved, flg. gls. ovate acute, palea obtuse denticulate persistent, grain short truncate at both ends. Griseb. in Goett. Nachr (1868) 75; Duthie Grass N.W. Ind. 38. E atropurpulea, Hochst. er Steud. Syn. Gram. 267. E. amabilis, Willd. non Linn. ex Ham. in Wall. Cat. n. 3842. E. paniculata, Thwaites Enum. 17 Zeyl. 373 (non Steud.).—Eragrostis, Wall. Cat. n. 3834, 3835, 3842, 3846.

Temp. and trop. HIMALAYA, ascending to 9000 ft from Simla to Sikkim and the Khasia Hills, and southward throughout the Deccan Peninsula. Ceylon,

Thwartes (C.P. n 2626).

Stem 6 m -3 ft., erect, stout or slender, usually stout and leafy at the base, simple or branched. Leaves in small forms chiefly basal and flat, in taller elongate; mouth of sheath bearded. Panicle up to 2 ft long and broad, very copiously but loosely branched except in small specimens, rachis glabrous at the nodes, branches simple below, pedicels usually longer than the spikelets. Spikelets olive-grey; empty gls. membranous, keels scabrid; flg. gls.  $\frac{1}{16}$  -  $\frac{1}{14}$  in. Stamens 3, anthers  $\frac{1}{30}$  in.  $G_7$  and  $\frac{1}{33}$  in, or smaller, dorsally slightly grooved.—Habit as variable as of E. pilosa.

23. E. ferruginea, Beauv. Agrost. 71; perennial?, basal sheaths broad compressed keeled, panicle oblong, branches solitary or 2-nate filiform rather stiff, pedicels longer than the spikelets, spikelets  $\frac{1}{4}$  in linear to ovate 3-11-fld, empty gls. unequal acute 1-nerved, rachilla tough, fig. gls. ovate acute or acuminate, palea obtuse much shorter than its gl. persistent keels scabrid, grain obovoid truncate at both ends. Franch. & Sav. Enum Pl. Jap. ii. 177; Miq Prolus. Fl. Jap. 188. E. orientalis, Trin. in Bunge Enum. Pl. Chin. Bor 71, in Mem Acad. Petersb. Ser. VI. iv. II. (1838) Suppl. 73. Poa ferruginea, Thunb Fl. Jap 50.

SIRKIM HIMALAYA; Lachoong Valley, alt. 9000 ft., in meadows with E. nigra,

J. D. H .- DISTRIB N. China, Japan.

- Stem with the panicle in the Sikkim specimen 18 in., erect. Leaves 3-5 in., narrow, or the lower broad at the base; sheath naked at the mouth. Panicle 4-6 in., shorter than in E. nigra, with stouter branches and fewer spikelets; branches rather wiry, bearing few dark spikelets. Spikelets dull green to violet. GL. I about  $\frac{1}{6}$  in., shorter than II; flg. gls.  $\frac{1}{11}$  in Stamens 3, anthers  $\frac{1}{12}$  in or Indian specimen, but it seems to be identical with the Chinese and Japanese plant. Bunge says that the same plant is cultivated in Hort. Petrop. from Nepal seeds.
- B Sect. III. Desmostachya, Stapf. Spikelets much compressed, imbricate, secund, sessile and jointed on the very short densely crowded branchlets of a tall narrow racemiform panicle, deciduous, acute; rachilla subarticulate.
- 24 E. cynosuroides, Beauv. Agrost. 71, 162; perennial, tall, branched from the base, leafy, panicle linear-elongate, branches very short crowded, densely covered from the base with sessile imbricating much compressed deflexed spikelets  $\frac{1}{2}$  in. long up to 30-fld., empty gis. very unequal, rachilla tough, flg. gls broadly ovate acute, palea shorter than its gl. Steud. Syn. Gram. 264; Wight Cat n 1774, 1774b.; Trin. in Mem. Acad. Petersb Ser. VI. i. (1831) 415; Dalz. & Gibs Bomb Fl. 298; Aitchus

Cat. Panjab. Pl. 169; Duthie Grass. N.W. Ind. 37, Fodd. Grass. N. Ind. 62, t. 40; Boiss. Fl. Orient. v. 583; Lisboa in Journ. Bomb. Nat. Hist. Soc vii. (1893) 387. Poa cynosuroides, Retz. Obs. iv. 20; Roxb. Fl. Ind. 1. 333; Del. Fl. Ægypt. 159, t. 10; Grah. Cat. Bomb. Pl. 236; Kunth Enum. Pl. i. 227. Leptochloa bipinnata, Hochst. in Flora, xxxviii. (1855) 422. Briza bipinnata, Linn. Syst. Nat. x. 875. Cynosurus durus, Forsk. Fl. Ægypt. Arab. 71. Dactylis interrupta, Herb. Rottl. Uniola bipinnata, Linn. Sp. Pl. Ed. II. 104.—Eragrost. affine & Eragrostoides, Wall. Cat. n. 3821, 5016.

PLAINS of INDIA, from Peshawur and Sind to Burma and southward, in moist

places. (Not in Ceylon) - DISTRIB Westward to Syria and N. Africa.

Rootstock stout, creeping; stolons very stout clothed with slining sheaths; steins 1-3 ft, tuffed, smooth, erect, stout. Leaves many, basal fascicled, very long, rigid, long acuminate tips filiform, margins hispid; mouth of sheath with long hairs; ligule 0. Panicle 6-18 in. by 1 rarely 2 in broad, strict, erect, narrowly pyramidal or columnar, often interrupted; rachis puberulous, branches  $\frac{1}{4}$ -1 in, very many crowded; branchlets rigid, glabrous or hispidulous, spreading. Spikelets unilateral, 2-seriate and crowded, deflexed, pale brown, rather shining; internodes of rachilla very short; gl. I  $\frac{1}{30}$  in.; II about  $\frac{1}{15}$  in., obtuse; fig. gls.  $\frac{1}{16}$  - $\frac{1}{13}$  in, coriaceous; palea  $\frac{1}{1-3}$  shorter than its gl., rather coriaceous, keels minutely scabrid. Stamens 3, authers  $\frac{1}{37}$  in. Grain less than  $\frac{1}{40}$  in., obliquely ovoid, laterally compressed, obscurely trigonous.

- C. Sect. IV. Plagiostachya, Benth. Spikelets secund distichously spreading in a long simple slender terminal spike.
  - \* Keels of palea distinctly winged.
- 25 **E. leioptera**, Stapf.; perennial, leaves convolute wiry, spikelets  $\frac{1}{3}-\frac{1}{2}$  in. oblong compressed 10-20-fid., glumes tumid, I  $\frac{1}{14}$  in. acute, wings of keels of palea  $\frac{1}{100}$  in. broad eculiate.

KHASIA HILLS, alt. 4-5000 ft., Griffith, &c.

Stems 1-2 ft., densely tufted, erect, very slender, strict. Leaves 8-12 in, glabrous, stout, terete, pungent; sheaths short. Spile 6-10 in., erect, strict; rachis angular, smooth. Spilelets not crowded, suberect; empty glumes  $\frac{1}{12}$  in. subequal, or I shorter; I acutely keeled; II dorsally rounded; fig. gls. boradly ovate, obtuse or subacute,  $\frac{1}{10}$  in.; wings of palea hyaline. Anthers about  $\frac{1}{16}$  in. long—The more tumid glumes at once distinguish this from E bifaria.

26. E. bifaria, Wight ex Steud. Nom. Ed. II. i. 562, Syn. Gram. 264, Suppl. 282; perennial, leaves flat or complicate and kieled, spikelets \(\frac{1}{4}\frac{3}{3}\) in. ovate-oblong rarely linear much compressed 6-40-fld., wings of keels of palea about \(\frac{1}{100}\) in. broad ciliate. Wall. Cat. n. 3827 B. C.; Wight Cat. n. 1773; f. Lisboa in Journ. Bomb. Nat. Hist. Soc. vii. (1893) 387. E. thraulostachys, K. Schum. ined. Poa bifaria, Vahl Symb. ii. 19; Roxb. Fl. Ind. i. 331; Kunth Revis. Gram. i. 334, t. 80, Enum. Pl. i. 327, Suppl. 282.

The DECCAN PENINSULA, Heync, &c. - DISTRIB Africa trop.

Stem 1-3 ft, densely tuffed, erect, simple, subcompressed, glabrous, base clothed with the soft fibres of old sheaths. Leaves  $2-2\frac{1}{2}$  in , linear, wiry, sometimes  $\frac{1}{2}$  in. broad, flexuous, acute, rigid, smooth; sheaths scaberulous, keeled; ligule a ciliate line. Spike 10-12 in., ovate to oblong and 15-20-fid., rarely linear flexuous and up to 40-fid, erect, rachis smooth, subcompressed. Spikelets spreading, lower fewerfid., olive-grey or -green; gl. I very acute or acuminate; II almost  $\frac{1}{12}$  in., keel very stout, rounded; fig. gls.  $\frac{1}{8}$  in., broadly ovate, subacuminate, keel scaberulous above, nerves faint. Stamens 3, anthers  $\frac{1}{28}$  in.

27. **E. Collettii**, Stupf; perennial, leaves filiform convolute, spikelets 1-1 in. linear or oblong-linear slightly compressed 6-12-fid., glumes tumid, wings of keels of palea about  $\frac{1}{\sqrt{100}}$  in broad minutely ciliate.

BURMA, Pinmona, Abul Huk; Meiktalla, Collett.

Stems 18-20 m., densely tuited, very slender, bases densely clothed with a brush of soft filiform fibres 4 in. long. Leaves 2-4 in., glabrous or sparsely hairy. Spike 5-7 in., erect, strict or slightly curved; rachis slender, terete, smooth Spikelets purplish, erect, close-set, almost imbricating; empty gls. subequal, \(\frac{1}{16} - \frac{1}{4} \text{in.}, \text{I acutely}\) keeled; II dorsally rounded; fig gls. 1 in. or less, turgid, broadly ovate, obtuse or acute with incurved tips; palea almost as long as the gl, dorsally pubescent. Anthers almost 🚣 in.

- \*\* Keels of palea not or obscurely winged.
- 28. E. nardoides, Trin. in Mem. Acad Petersb. VI. 1. (1831) 415, perennial leaves 3-9 in almost capillary convolute with tufts of hairs on the surface below the middle, spike very long slender, spikelets  $\frac{1}{3}$  in. and upwards oblong to linear 20-32-fld., glumes turgid E. bifaria, Wall. Cat. n. 3827 D F.; Duthie Grass. N.W. Ind 36, Fold Grass N. Ind. 61, t 73, Griseb. in Goett. Nachr (1863) 76; Steud, Syn. Gram 266.

OUTER HIMALAYA, from the Panjab to Nepal, up to 5500 ft. Behar, on Parasnath, and Chota Nagforf, Clarke, J. D. H.

Stems 12-18 m., densely tuited, filiform. Leaves as long as the stem or shorter.

- Spile 6-10 in., very slender, straight or subflexuous; rachis terete, smooth. Spikelets erecto-patent, close-set, laterally compressed, olive-green, empty gls. subequal or I slightly shorter, acutely keeled;  $II \frac{1}{12}$  in. or less, obtusely keeled; fig. gle, nearly \(\frac{1}{2}\) in., ovate, acute or subobtuse, nerves faint, keel smooth or nearly so. Anthers 17 in. Grain 10 in. or more, narrowly ellipsoid or subovoid, subterete or obscurely triquetrous, epicarp finely reticulate.
- 29. E. coromandelina, Trin. in Mem. Acad. Petersb. VI. i. (1831) 415; perennial, leaves 1-3 in. filiform convolute puberulous above, spikelets  $\frac{1}{6-\frac{1}{2}}$  by  $\frac{1}{12}$  in. oblong to linear 10-32-fld Steud. Syn. Gram. 264. E. cretacea, Nees in Ann. Nat. Hist. i. (1838) 284. Poa coromandelina, Koen. ex Rottl. in Ges. Naturf. Fr. Berl. Neue Schrift. iv. (1803) 191; Roth. Nov. Pl. Sp. 71; Kunth Enum. Pl. i. 327. P. secunda, Roxb. Ic. pict. ined. t. 827.

PLAINS OF INDIA; from Rajputana to Behar, and southwards. CHOTA NAGPORE. Wood. UPPER BURMA, Abdul Huk.

Stem 12-18 in., rather stout. Leaves short, rarely flat, spreading and recurved. Spike 4-8 in , interrupted; rachis slender, terete, smooth. Spikelets close-set, electo-patent, laterally compressed, olive-grey or -green; empty gls. equal or I slightly shorter, acutely keeled; II  $\frac{1}{12}$  in. or less, usually obtusely keeled; fig. gls. up to  $\frac{1}{12}$  in., ovate, acute or subobtuse, nerves faint, keel smooth or nearly so; palea almost as long as its gl., keels sometimes obscurely winged scabrid. Stamens 3, anthers  $\frac{1}{32}$  in. Grain  $\frac{1}{50}$   $\frac{1}{30}$  in., shortly ellipsoid or subovoid, obtusely 3-quetrous, epicarp loosely reticulate.

30. E. secunda, Nees ex Steud. Syn. Gram. 264; perennial, leaves 6-18 in. convolute or flat minutely puberulous above, spike very slender flaccid, spikelets ½ in. linear-oblong up to 10-fld., empty gls. unequal. E. bifaria, Thwaites Enum. Pl. Zeyl. 373 (excl. Syn.); Trim. Cat. Ceyl. Pl. 109.

CEYLON, ascending to 5000 ft., Walker, Thwaites (C.P. 60).

Spikelets secund or distichous, laterally compressed, olive-grey or straw-colrd.; empty gls. unequal, I about  $\frac{1}{12}$  in. acutely keeled; II  $\frac{1}{7}$  in., dorsally rounded; fig. gls.

in , ovate, acute; palea with rather narrow scabrid keels. Anthers 15 in. long. Grain almost 135 nn., elongate ovoid or ellipsoid, almost terete.—The materials for this species consist of only two specimens, one from Thwaites (C.P. 60), with leaves 6-7 in. convolute, electo-patent; the other, from Walker, with much longer flat or subconvolute leaves 8-10 in. long.

31. **E. brachyphylla,** Stapf; perennial leaves  $2\frac{1}{3}$ —4 in. linear plicate glabrous above. spikelets  $\frac{1}{4}$ — $\frac{1}{4}$  in. oblong to linear about 20-fid., empty gls subequal. E. bifaria, Wall. Cat. n. 3827 A. E. E bifaria,  $\beta$ . minor, Wight & Arn. in Wight Cat. n. 1773 C. & Herb. n. 3528, 3356. Poa secunda, Roxb. ex Wall. Cat. l.c. A. P. bifaria, Vahl, & P. coromandelina, Roth. e. Wight Cat. n. 1773b.

From BEHAR and the CENTRAL PROVINCES, southward to the Nilghiris, Wulkt, Perrottet

Stem densely tufted, 10-18 in., slender. Leaves coriaceous, acute, rarely flat and  $\frac{1}{10}$  in. broad. Spikes 3-6 in., slender. Spikelets close-set, usually secund, slightly compressed, olive-green; empty gls. up to  $\frac{1}{12}$  in., I acute, acutely keeled; II obtuse, dorsally rounded; fig. gls. up to  $\frac{1}{12}$  in., broadly ovate, obtuse, keel scaberulous below the tip; keels of palea narrow, scabrid. Anthers  $\frac{1}{32}$  in. Grain  $\frac{1}{10} - \frac{1}{30}$  in., shortly ellipsoid, obscurely triquetrous, almost terete, epicarp coarsely reticulate

#### INDETERMINABLE SPECIES RECORDED AS INDIAN.

E cernua, Steud Syn. Gram 266. Poa cernua, Willd. in Ges. Naturf. Fr. Berl. Neue Schrift. iv. (1803) 182.

E. confinis, Nees ex Steud. 1 c. 265.

## 105. MYRIOSTACHYA, Hook. f.

A tall stout perennial glabrous grass. Leaves very long, flat. Spinelets 4-20-fld, racemed on the short branchlets of a narrow elongate panicle, pedicels jointed at the base; rachilla stout, flexuous, naked, at length jointed at the base and between the fl. gls. Glumes coriaceous, dorsally rounded, I and II very small, ovate, 1-nerved, keeled, long-awned; fig gls. ovate, cuspidately acuminate, keeled, 3-nerved; palea coriaceous, as long as its gl., tip 2-toothed, keels close together stout scabrid-ciliate. Lodicules very minute, obliquely cuneate, retuse. Stamens 3, anthers very small. Ovary globose, styles united at the very base, stigmas long penicillate. Grain obliquely ovoid, obtuse, subterete, scutellum large.—Eragrostis, Sect. Myrrostachya, Benth. in Journ Lunn Soc. xix. (1881) 117.

M. Wightiana, Hook. f. Eragrostis Wightiana, Benth. in Hook Ic. Pl. xiv. 62, t. 1381. Leptochlon Wightiana, Nees e. Steud. Syn. Gram. 209; Wight Cat. n. 1757. Dinebra verticillata, Wight ex Steud. l.c. Festuca natans, Ham. in Wall. Cat. n. 3823.—Eragrost. affine, Wall. l. c.

Marshes in the Sunderbunds, Hamilton, Griffith, &c. S India? Herb. Wight

Tenasserim, Helfer.

Stem 6-10 ft, densely tufted, erect from a stout sheathed sometimes floating rootstock with long branching roots, as thick as the thumb at the base, smooth, simple or sparingly branched. Leaves several feet long, up to \(\frac{1}{2}\) in. broad, linear, finely acuminate, quite smooth; sheath very long, narrower than the blade, of lower leaves broad and compressed, liquid 0. Panicle 1-2 ft. by 2-3 in. broad; rachis quite smooth; branches 1-11 in, very many, crowded fascicled and whorled erectopatent, flowering to the base. Spikelets \(\frac{1}{4-3}\) in, 4-8-fld., compressed, quite smooth; pedicels short, gls. I and II unequal, keels scaberulous, awn \(\frac{1}{3}\) in. or more stiff stout.—In many respects \(\frac{Myriostachya}{3}\) is allied to \(\frac{Eragrostas}{3}\) cynosuroides, having a very similar inflorescence, and spikelets jointed on the branchlets of the panicle; but differs in the spikelets being pedicelled, in the long awned gls. I and II, and in its great size.

Var. longuspicula; spikelets longer, up to ½ in and 8-20-fid.—Penang, Curtis Ceylon; at Kottiyar, Trimen.

### 106 HALOPYRUM, Stapf.

A tall stout perennial glabrous grass, with a branching creeping sheathed rootstock. Leaves narrow, rigid, convolute. Spikelets large, many-fld, sessile or shortly pedicelled on the short alternate branches of an elongate panicle, ovate, strongly laterally compressed, not jointed on their pedicels, nor are the pedicels on the branches, rachilla jointed at the base and between the fig. glumes, silkily hairy. Glumes many, closely distinctionally imbricate, dorsally rounded, corraceous, keeled, I and II subequal, empty, ovatelanceolate, acuminate or apiculate, I 3-nerved, II 5-nerved, fig gls. 6-10, rather shorter than the empty, mucronulate, 3-nerved, palea as long as the gl., subscute, 2-keeled. Lodicules 2, obcordate. Stamens 3. Styles short, free, stigmas elongate. Grain ellipsoid, compressed, deeply hollowed anticously, free.

H. mucronatum, Stapf in Hook Ic. Pl. t. 2448 Brizopyrum mucronatum, Nees in Wall. Cat. n. 8898; Wight Cat. n. 2386. Desmazeria unioloides, Defl. Voy. Yemen, 220. Eragrostis mucronata, Trim. Cat. Ceyl Pl. 109 (non Roem. & Sch.). ? Uniola mucronata, Linn. Sp. Pl. 104; Kunth Enum. Pl. i 425; Steud. Syn. Gram 281. Triticum repens, Thwaites Enum. Pl. Zeyl 376.—Æluropus, Astehis. Cat. Panyab Pl. 169.—Eragrostis sp. Sect. Sclerostachya, Benth. in Gen. Plant. iii. 1187.

Coasts of India from Sind to Cape Comorin and Tinnevelly. CEYLON, Gardner,

&c.-DISTRIB. Westward to Arabia and E. trop. Africa.

Stem below creeping, as thick as a crow-quill, hard, smooth, woody, with strict vermiform roots, sending up rigid slender flowering stems 12-18 in. high, and shorter leafing ones. Leares 8-12 in., flat or convolute, very narrow, wiry, glaucous, finely actuminate, glabious, sheath terete, appressed, striate, hard, mouth villous; ligule a few hairs. Panicle 12-16 in., erect or inclined; branches short with few spikelets and rachis quite smooth. Spikelets \( \frac{1}{2} \) in. long, sessile or shortly pedicelled, smooth, white or pale yellowish; rachilla very short, hairs half as long as the gls.; gl. I hardly longer than the lowest flg. gl., ovate-lanceolate, apiculate, 5-nerved towards the centre; II \( \frac{1}{4} \) longer, strongly 5-nerved.—There being no specimen of Uniola mucronata in Linnæus's Heibarium its citation here is doubtful.

# 107. COELACHYRUM, Nees.1 (See p. 8.)

# 108. DIPLACHNE, Beauv.

Tall perennial grasses. Leaves flat or convolute, narrow. Spikelets many-fld., spicate on the slender simple branches of a tall simple panicle.

 $<sup>^{\</sup>mbox{\scriptsize 1}}$  This genus was erroneously supposed to be Indian when the Key was drawn up.

not jointed at the base; rachilla jointed at the base and beneath each fig. gl, not produced beyond the uppermost gl. Glumes many, I and II unequal, obtuse, membranous, I-nerved, persistent; fig. gls. rather longer, oblong, 1-3-nerved, tip 2-4-toothed, mucronate or awned; palea linear. Loducules 2, broad Stamens 3, anthers short Styles distinct, stigmas plumose. Grain ovoid-oblong, subtrigonous, free within the gls. and palea.—Species about 14, of warm regions

A second Indian species has lately been brought from Chitral, and will shortly be published by Dr. Stapf in the Kew Bulletin as D Gatacrei.

D. fusca, Beauv. Agrost. 163; tall, leaves convolute, panicle long, spikelets \( \frac{1}{2} \) \( \frac{1}{2} \) in. linear 4-10-fid. Benth. Fl. Austral. vii. 619; Boiss Fl. Orient v 561; Trim Cat. Ceyl. Pl. 109. D. indica, Spring Syst. i. 351. Uialepis fusca, Steud Syn. Gram. 247, Thwaites Enum. Pl. Zeyl. 372. U. Drummondii, Steud. l.c. Triodia ambigua, Br. Prodr. 183. Tridens indicus, Nees in Wight Uat. n. 1794. Leptochloa? fusca, Kunth Revis. Gram. 1 91, Enum. Pl. i 271. Festuca fusca, Linn. Sp. Pl. 109, Del Fl. Egypt 24, t. xi f. l. F. indica, Retz. Obs iv. 21; Kunth Enum. 412. F. reptatrix, Linn Sp. Pl. Ed. II 108; Kunth l.c. 410. Eiagrostis procera, Stend l c 266. Poa procera, Roxb. Fl. Ind. 1. 332; Kunth l.c. 345 Bromus polystachios, Forsk Fl. Eg. Arab. 23. Eragrostis, Wall. Uat. n. 5013.—Rheede Hort. Malab. xii. t. 45.

UPPER GANGETIC PLAIN to BENGAL and southward to CEYLON .- DISTRIB.

Egypt, Trop. Asia, Africa, and Australia.

Stem tufted, 3-5 ft, stout, erect, or geniculately ascending, often branched, clothed with leaf-sheaths. Leaves long, narrow, flat or convolute, smooth; sheaths smooth; ligule large, membranous, lacerate. Panacle 10-18 in., oblong, nodding; rachis smooth; branches 2-3 in., erect, filiform, smooth or scaberulous. Spikelets distant, very shortly pedicelled, pale or dark green; rachilla smooth or scaberulous; callus hairy; gls. I and II 1-nerved, tips erose, keels nearly smooth; I lanceolate; II \(\frac{1}{2}\) longer, oblong; fig. gls. thinly coriaceous, 3-nerved, lateral nerves submarginal, tip 4-toothed, mucronate by the percurrent median nerve.

## 109. MELICA, Linn

Perennial erect grasses. Leaves narrow. Spikelets in open or spiciform or racemiform panicles, laterally compressed, jointed or not on their pedicels, 1-3-fld. and with small convolute neuter gls. forming a clavate o narrow body terminating and jointed on the elongate rachilla. Glumes 4 or more, membranous, hyaline or with hyaline tips and margins; I and II equal or unequal, empty, I 1-3-nerved; II 5-nerved, persistent or separately deciduous, flg. gls. solitary, or 2-3 then distant on the rachilla, 5-9-nerved, lowest stipitate; palea 2-keeled. Lodicules 2, connate, often most minute or 0 Stamens 3. Styles free, stigmas plumose. Grain oblong fusiform or subcylindric.—Species probably 20 or 30, of temp. regions.

- \* Panicle spiriform or racemiform; spikelets more or less jointed on their pedicels; lodicules most minute or 0.
- 1. M. Cupani, Guss. Fl. Sicul. Prodr. Suppl 17; panicle subspiciform, flg. gl. solitary clothed all over with long silky hairs. Boiss. Fl. Orient. v. 590; Parlat. Fl. Ital. i. 301. M. cılıata, Duthie Grass. N.W. Ind. 39 (non Linn.) M. Jacquemontii, Decne in Jacquem. Voy. Bot. 174, t. 175; Duthie l.c. M. Hohenackeri, Boiss. Diagn. Ser. I. xiii. 54. M.

micrantha, Boiss & Heldr. var. inacqualts, Griseb. in Goett. Nachr (1868) 76. M. persica, Kunth Revis. Gram. 1. 351, t. 89, Enum Pl. 1. 375, Suppl. 311; Ledeb. Fl Ross, iv. 398, Duthie l. c.; Griseb. l. c. 76, 77. M. trachyantha, Boiss. Diagn Ser. I. vii. 124.

WESTERN HIMALAYA; in the drier regions from Kumaon westwards, alt. 7-11,000 ft. WESTERN TIBET, alt. 8-11,000 ft —DISTRIB. Westwards to Spain and N. Africa.

Stems 8-18 m, densely tufted, creeping below, very slender. Leaves 2-8 in., very narrow, flat or convolute, and as well as the sheaths glabrous puberulous or tomentose with spreading or reflexed hairs; ligule oblong, short, or 0. Panicle 2-4 m.; raches filitorm, smooth; branches very short and pedicels scaberulous. Spikelets more or less second,  $\frac{1}{6}-\frac{1}{3}$  in. long, subtract or spreading, pale straw-colrd. or dark purple, rachilla glabious, very short slender and geniculate below the fig. gl., stouter and strict beyond it, articulate beneath the neuter gls. Glumes all scaberulous, I !-! shorter than II, ovate, subacute, 1-3- rarely 5-nerved; II lanceolate, acute, 5-nerved; fig. gl. about as long as II, clothed with straight hairs nearly as long as itself that spread when dry, 7-nerved; palea oblong, 2-toothed, scaberulous, keels chiolate; lower neuter gls. cornaceous, glabrous scabrid hispidulous or rarely sparsely hairy, usually obliquely clavate and truncate, rarely oblong, strongly nerved Lodicules 0 or most minute. Grain fusiform.—A most variable plant, presenting, according to Boissier, eight varieties, and under which are ranged fourteen species of his own and other authors. The Indian specimens may be roughly classed under two very distinct-looking forms, which, but for Boissier's wider experience and authority, I should have been disposed to regard as species; though I find specimens which seem to be intermediate between them. These are, M. Cupani, Guss. (which includes trachyantha, Boiss ) with stems 12-18 in. high, pale straw-colrd. spikelets \(\frac{1}{4} - \frac{1}{3}\) in. long, with gl II usually only about I longer than I; and M. persica, Kunth (including Jacquemontu, Decne.), with stems 6-12 in. high, purple (rarely pale yellowish) spikelets  $\frac{1}{6} - \frac{1}{4}$  in. long, and gl II almost twice as long as I. In both the leaves or their sheaths or both, are glabrous or tomentose, and the club-shaped neuter gls. from nearly smooth to scabrid.

2. M. nutans, Linn. Sp. Pl. 66; panicle racemiform very lax, spikelets 2-fid., gls I and II cymbiform very obtuse, III quite glabrous. Fl. Dan. t. 902; Host Gram. Austr. ii. 9, t. 10; Gærtn. Fruct. ii 5, t. 80, f 4; Schreb. Gram ii. 62, t. 6, f 2; Engl. Bot. t. 1059; Knapp Gram. Britt. t. 42; Kunth Enum. Pl. 1. 376; Cav. Ic. t. 175; Reichb. Ic. Fl. Germ. t. 72; Steud. Syn. Gram. 291; T. Nees Gen. Fl. Germ. Monocot. 1 n. 60; Ledeb. Fl. Ross iv 399; Boiss. Fl. Orient. v. 568.

Kashmir, Falconer; at Hirpoor, alt. 8000 ft., Clarke.—Distrib. Europe, N. Asia.

Stem 10-18 m., very slender, inclined, from a long stoloniferous rootstock. Leaves 6-10 m., very narrow, acuminate, sparsely hairy; ligule very short or 0. Panicle long, nodding or drooping, rachts and few branches secund, capillary. Spikelets \(\driam\) in long, few, distant, very shortly pedicelled, pendulous, broadly oblong; gls. I and II subequal, scarious, green or purplish; III oblong, strongly many-nerved, scaberulous. Lodicules minute, connate. Grain fusiform.

- \*\* Panicle with spreading branches; spikelets not jointed on their pedicels; gl. I and II persistent, neuter gls. forming a small oblong body; lodicules 2, connate.
- 3. M. scaberrima, Hook. f.; branches of panicle elongate opposite alternate or 3-nate, spikelets 3-5-fid., gls. I and II ovate-lanceolate, fig. gls. narrowly lanceolate. Festuca scaberrima, Nees ex Steud. Syn Gram. 316. Glyceria scaberrima, Steud. l.c.; Duthie Grass. N.W. Ind. 41. Poa Zizania, Jacquem mss

WISTERN TEMPERATE HIMALAYA; from Kashmir to Kumaon, alt. 6–10,000 ft. Stem 3–5 ft , very slender, flaccid, smooth. Leaves 8–10 by  $\frac{1}{6}-\frac{1}{6}$  in., more or less scabrid; sheaths scabrid, hirsute on the upper margins; ligule short, truncate, 2-auricled. Panicle very variable, rarely reduced to a subsimple raceme; rachis fulform; branches 2–5 in., at length horizontal, often 2 in. apart, smooth or scabrid. Spikelets often irregularly disposed, shortly pedicelled, clowded on short branchlets, or distantly scattered,  $\frac{1}{4}-\frac{1}{2}$  in. long, pale green; rachilla slender, scaberulous; gl. I and II ovate-lanceolate, I 1-nerved; II 3-nerved; flg. gls. distant, lowest about twice as long as II, narrowly lanceolate, strongly 7–9-nerved, tip quite entire; palea shorter than its gl., keels scaberulous. Lodicules very minute Antheis variable in length Gram subcylindric or fusiform—Closely alhed to the Affghan M. secunda, Regel (M. gracilis, Artch. & Hemsl.) a native of Affghan and Turkestan.

Var. micrantha; spikelets 1 in, leaf-sheaths nearly smooth, ligule hardly

auricled .- Kishtwar, alt. 6000 ft., Clarke

## 110. LOPHATHERUM, Brongn

Tall slender leafy perennial grasses. Leaves petioled, lanceolate, acuminate, nerves tessellate. Spikelets 1-fid., narrowly lanceolate, terete, solitary, secund and jointed on the long strict alternate branches of a lax panicle; rachilla not jointed at the base, produced beyond the fig. gl. and bearing several closely sheathing awned empty gls Glumes dorsally rounded, I and II empty, oblong, obtuse, margins membranous, 5-nerved, deciduous with the fig. gl.; III much longer, coriaceous, ovate-oblong, 7-9-nerved, mucronate or shortly awned; keels of palea narrowly winged, smooth. Lodicules 0. Stamens 3. Styles connate at the base, stigmas long. Grain oblong, free.—Species 1 or 2, trop. Asia.

L. gracile, Brongn in Duparr. Voy. Bot. 50, t. 8; Kunth Enum Pl. i. 391, Steud Syn Gram 300; Benth. Fl. Hongk 433; Thwaites Enum. Pl Zeyl. 374, Trim. Cat Ceyl. Pl. 109; Miq. Fl. Ind. Bat. ii. 400 L. elatum, Zoll. & Mor. Syst. Verz. Zoll. 102. L. japonicum, multiflorum and dubium, Steud. Syn Gram 300. L Lehmann, Nees ex Steud. l.c. Acroelytrum japonicum, Steud. in Flora, xxix. (1846) 21. Allelotheca Urvillei, Steud. Syn. Gram. 117.—Centothecæ affine, Wall. Cat. n. 8900.—Griff. Ic. Pl. Asiat t. 152, f 2.

TROPICAL HIMALAYA, from Sikkim eastwards, the Khasia and Naga Hills, Burma, Ceylon (up to 4000 ft.), and the Malaya Peninsula.—Distrib. China.

Japan, Malaya, N. Guinea.

Stem 2-5 ft., ascending from a branched woody rootstock. Leaves 4-10 by \( \frac{1}{2}-\frac{1}{4} \) in., narrowed into a slender peticle \( \frac{1}{4}-\frac{1}{2} \) in long; sheaths smooth; ligule minute. Panicle of few distant strict stiff smooth branches, 6-18 in. long. Spike-lets \( \frac{1}{4}-\frac{1}{4} \) in, including the short awas of the closely imbricate upper empty glumes, which form a pencil of short erect or spreading bristles projecting from the apex of the tightly rolled fig. gls.—It is remarkable that this plant has not been observed in the Deccan Peninsula

#### DOUBTFUL SPECIES.

L. DUBIUM, Steud. Syn. Gram. 300.—Herb. Wight. n. 1090. The description is of leaves only, and quite unrecognizable.

# 111. CENTOTHECA, Desv.

Tall perennial grasses. Leaves broadly lanceolate, tessellately nerved. Spikelets 1-2-fld., secund on the long branches of a lax subsimple panicle,

not jointed on the very short pedicels; rachilla jointed at the base and between the fig. gls. Glumes 5, I and II oblong-ovate, keeled, 3-5-nerved, empty, persistent; fig. gls. oblong, acute, dorsally rounded, 7-nerved, naked or the upper bearing soft erect at length deflexed tuberclc-based spines above the middle; palea shorter than the gl., keels ciliolate. Lodicules 0. Stamens 2-3, anthers short. Styles free. Grain ovoid, acute, terete, free.—Species 1 or 3?, Trop. Asia, Africa, Australia.

C. lappacea, Desv. in Nouv Bull. Soc. Philom. ii. (1810) 189, & in Journ. Bot. 1. (1813) 70; Beauv. Agrost. 69, t. 14, f. 7; Kunth Revis Gram. i. 317, t. 70, Enum. Pl. i. 366, Suppl. 302; Steud. Syn. Gram. 116, Thwo. Enum Pl. Zeyl. 374; Trim Cat. Ceyl Pl. 109; Wall. Cat. n. 3826; Griff. Notul. ni. 62, Ic Pl. Isiat t. 152, f 1; Mig. Fl. Ind. Bat. ni. 398, Benth Fl. Austral. vn. 640; Hochst. in Bot. Zeit. (1857) 33; Lisboa in Journ. Bomb. Nat. Hist. Soc. vn. (1893) 388. C. latifolia, Trin Fund. Agrost. 141. C. parviflora, Anderss. in Peters. Reise Mosamb. Bot. 559. Herocchioa, Hainth Revis Gram. i. 21. Holcus latifolius, Osbeck. Iter. 247; Linn. Syst. Ed. x. 1305. Oplismenus? magellanicus, Roen. & Sch. Syst. ii. 485. Melica lappacea, Rasp. in Ann. Sc. Nat. Ser. I. v. (1825) 443. M. diaudra & refracta, Roxb. Fl. Ind. i. 327. Poa latifolia, Forst. f. Prodr. 8; Vahl Symb. ii. 18. P. malabarica, Linn. Sp. Pl. 69; Burm. Fl. Ind. 27, t. 11, f. 2. P. nemoralis, Heyne ex Wall. Cat. n. 3826. A. Torresia? latifolia, Beauv. l. c. 165. T. biflora, Roem. & Sch. Syst. ii. 515. Uniola lappacea, Trin. in Act. Petrop. VI. (1831) 358, Sp. Gram. Ic. t. 298. Cenchrus lappaceus, Linn. Sp. Pl. Ed. II. 1488. Festuca latifolia, Roth. Nov. Pl. Sp. 75. F. blepharophora, Roem. & Sch. Syst. ii. 728. F. ciliaris, Heyne ex Roem. & Sch. L. C. F. ciliata, Hb. Heyne ex Wall. Cat. n. 3826 A. F. Virgata, Heyne ex Steud. Nom. Ed. II. i. 633. Panicum festuciforme, Hochst. Pl. Ind. Or. Hohenack. n. 363.—Panicum, Wall. Cat. n. 8708.

TROPICAL SIKKIM HIMALAYA, the KHASIA HILLS, MUNNIPORE, BURMA, CENTRAL INDIA, and southward to MALACCA, the ANDAMAN ISLDS, and CEYLON.—DISTRIB.

Malaya, China, Polynesia, Africa trop.

Stem 1-3 tt, stout, erect from a branched woody rootstock, with stout root-fibres. Leaves 4-10 by 1-1½ in, many-nerved, glabrous or sparsely hairy, base narrow obtuse or subcordate, midrib oblique; sheath glabrous or lairy; liqule short, lacerate. Panicle 8-10 in. long and broad, branches smooth. Spikelets 1-½ in, green; rachilla scaberulous; palea often decurrent on the rachilla below the gl.—The number of fig. gls. varies, but 5 is, I think, a normal; I and II are rather distant at the base. In one spikelet I find 6 gls., of which III was empty naked and epaleate, IV naked and paleate, V and VI with stout reversed tubercle-based spines; not unfrequently the fem. spikelet has only a single strongly-armed gl. and a produced rachilla. Kunth (l. c Suppl. 302) describes gl. III and IV as complete and bisexual, V minute and imperfect. I suspect that this grass is polygamous.

## 112. STREPTOGYNA, Beauv.

A tall erect perennial grass. Leaves petioled, flat; nerves tessellate. Spikelets 1-4-fld., narrow, terete, subsessile, not jointed on the long, rigid, strict, unilateral spike; rachilla elongate and jointed between the fl gls. Glumes 3-6, very narrow, I and II empty, persistent; I small, 3-nerved; II longer, convolute, acute, awnless, many-nerved; III longer, rigid, tightly convolute, many-nerved, acuminate and awned; IV-VI empty; palea embraced by the gl., narrow, 2-fid. Lodicules 3, subulate. Stamens

2-3. Styles filiform; stigmas 2-3, very long, at length spirally twisted. Grain linear, terete, free but closely embraced by the gl. and palea.

S. crinita, Beauv. Agrostogr. 80, t. 16, f. 8; Poir. Encycl Suppl. t. 912; Kunth Enum Pl. i. 427, Suppl 349; Doell in Mart. Fl. Bras. ii. III. 171, t. 46; Steud. Syn. Gram 339; Griseb. Fl. Brit. W. Ind. 528; Thw. Enum. Pl. Zeyl 374; Trin. Cat Pl. Ceyl 110; Wight Cat. n. 2362. S. guianensis, Rich. ev Roem & Sch. Syst. 11. 614. Streptia crinita & secunda, Herb. Rich.

TRAVANCORE; Courtallam, Wight, Beddome. CRYLON; Matele district, Gardner.

DISTRIB. Africa and America trop.

Stem 4-6 ft, smooth Leaves often as long as the stem, lanceolate, gradually narrowed to the base and apex, membranous; sheath long, open; ligule short. Spikes terminal, 8-16 in long, with a spathiform basal sheath; rachis compressed, smooth, produced beyond the spikelets, with often an imperfect glume. Spikelets 1 in., quite smooth and glabrous; gls. subcoriaceous; I lanceolate, finely acummate; III narrowed into the very slender awn,  $\frac{1}{2}$  in. long. Anthers very long and narrow.

### 113. ÆLUROPUS, Trin. (ex parte).

Low much branched rigid leafy perennial grasses. Leaves districtions, usually spreading and convolute, rigid and pungent, rarely flat. Spikelets 6-many-fld., sessile or subsessile in oblong spiciform panicles or capitate, densely crowded, laterally compressed, villous, not jointed on their pedicels; rachilla jointed at the base and between the flg. gls. internodes very short. Glumes many, oblong, membranous, dorsally rounded, apiculate cuspidate or mucronate, I and II shorter than the flg. gls., I 1-3-nerved; II 5-7-nerved; fl. gls. closely imbricate, 7-9-nerved, longer than the empty gls.; palea as long and broad as its gl. broader upwards, truncate, keels ciliate. Lodicules 2, obliquely truncate. Stamens 3, anthers small. Styles free, stigmas plumose. Grain ovoid to oblong, free.—Species few, Reg Mediter., Oriental and Indian

Parlatore (Fl. Ital. i. 462) has, under Æl. littoralis, pointed out that two plants have been referred to Æ. lævis, Trin., namely, Dactylis brevifolia, Koen., and D. littoralis, Willd. The former of these is an Indian species, on which alone Trinius founded the genus, the latter being subsequently referred to it by Steudel (Nom. Ed. II. i. 30); but Parlatore was not aware of D. brevifolia being a species of Eleusme, and that therefore Eluropus, Trin., has no foundation. That this is so is evidenced both by Trinius's citation of Koenig's plant by name as his lævis, and by his figure of the fruit (Agrost. Fund. t. 12), which is conclusive. It would, however, appear from C A. Meyer (Verz. Pfl. Canc. 18 (1831) that Trinius may have included both D. brevifilia and littoralis under his A. lævis; for that author, quoting no doubt from the St. Petersburgh Herbarium, cites læris and villosus as species of Trinius, giving (by error) D littoralis as the authority for lavis, and Poa repens, Bieb., for villosus. Under these circumstances it appears to me that the best course to adopt, is to retain Æluropus as "Trin ex parte," for D luttoralis and other plants described by later authors under that generic name The alternatives are either to coin a new name for the latter, or to adopt for these Calotheca, Spreng. (Syst. i 342 (1825), which is a mixture of several genera, including Eluropi, and which name is better avoided, masmuch as there is an earlier Calotheca (Desv. 1810), likewise made up of several genera of grasses It remains to sav that the synonyms of Eleusine brevifolia (see p. 295), and of Eluropus littoralis and villosus are almost inextricably involved; and I am far from being satisfied with my attempt to disentangle the first and last of them.

E. villosus, Trin. ex C. A. Mey. Verz. Pfl. Cauc. 18; spikelets in short heads. Airches Cat. Panjab Pl 169. Æ. arabicus, Steud. Nom. Ed. II i 30 Æ brevifolius, Wall Cat. n. 8897; Wight Cat n 1792 (non Herb Wight & excl. Syn. Dactylis brevifolia, Lenn.); Duthie Grass. N.W. Ind. 39. Æ concinnus & siniacus, Fig. et Notar in Mem. Acad. Torin. Ser. II x11. (1852) 257 E. lagopodioides, Trin. ex Thw. Enum. Pl. Zeyl. 374. Æ. lagopoides, Trin ex Trim. Cat. Ceyl Pl. 110. Æ. littoralis, rar. repens, Coss. & Dur. Expl. Sc. Alger. 155. Boss. Fl. Orient v. 594. Æ. mucronatus, Aschers. in Schweinf Beitr. Fl. Æthiop 297, Boss l. c. 595. Æ. miliacus, Steud Nom Ed II. i 30 Æ. miloticus, Edgew. in Journ Linn. Soc vi. (1862) 196 Æ pubescens, Trin. ex Steud l c in part? Æ pungens, C Koch in Linnea, xxi (1848) 408. Æ repens, Parl Fl Ital. 1. 462, Edgew. l c Dactylis lagopodioides, Dalz. & Gibs. Bomb. Fl. 298 (excl. Syn). D. lagopoides, Linn. Mant. 33; Burm. Fl. Ind. 28, t 12, t. 2 (the right hand portion), Roxb. Fl. Ind 1. 340; Grah Cat. Bomb Pl. 236 (excl Syn) D. massaviensis, Steud. Syn. Gram 298. D. repens, Desf. Fl. Atlant i. 79, t 15. Poa lagopodioides, Kunth Revis. Gram. i. 111, Enum. 1. 325. P. massavensis, Fresen. in Mus. Senkenb. 11. (1837) 143. P. repens, Bieb. Fl. Taur. Cauc. iii 69. P. tunetana, Spreng. Pugill. 11. 20. Calotheca arabica, niliaca & repens, Spreng. Syst. Veg. 1. 347, 348. Duthie l.c. (err. typ. milacea) Kœleria lagopodioides, Panz. in Denkschr. Acad Muench. K brevifolia, Herb. Wight ex Wall. Cat. n. 8897 C. Sesleria lagopodioides, Spreng. Pugill. in. 22. Festuca mucronata, Forsk. Fl. Ægypt. 1rab. 22 F. pungens, Vahl Symb. i. 10, t. 2 Uralepis? pungens, Kunth Revis. Gram. 1. 108, Enum. i. 319.

Sandy shores of the DECCAN PENINSULA and CEYLON Salt plains of the Panjab

and SCIND.—DISTRIB. Reg. Mediterr, Arabin, Persia, Affghan., Reg. Casp.

A rigid percunial herb, with long wiry roots. Stems 6-12 in., densely tufted, branched, hard, smooth, erect, or prostrate with long often creeping stolons, base slightly swollen, clothed with rigid glabrous or hairy sheathing scales, above clothed with leaves, and terminating in a naked glabrous or pubescent slender peduncle 1-4 in. long. Leaves \(\frac{1}{6}\)-1 in , erect or spreading and recurved, subulate-lanceolate or acicular, confaccous, pungent, convolute, rarely flat, striated with close-set nerves, base rounded, glabrous or sparsely harry, midulo boscure, margins smooth or scaberulous; sheaths short, terete, inflated or dilated, glabrous or ciliate; ligule a ridge of short hairs. Heads \(\frac{1}{1-2}\) in. diam., globose ovoid or oblong. Spikelets \(\frac{1}{15-10}\) in., 4 many-fld., crowded, sessile, villous with soft hairs, pale green or white; gls. closely imbricate, ovate-oblong, apiculate, concave, margins hyaline, nerves strong; I 3-5-nerved; II longer, 7-9-nerved, fig gls. rather longer than the empty, many-nerved, lower 2-4 sometimes neuter, palea broadly truncate or 3-lobed, keels villous. Ovary obovoid. Grain 10 in, obovate-oblong, compressed dorsally. A very variable grass in habit, foliage and size of the heads and spikelets. garded by Cosson and others as a form of A. littorales, in which the panicle is elongate

## 114. DACTYLIS, Linn

Stiff erect tufted perennial grasses Leaves flat. Spikelels 3-10-fld compressed, subdistichously crowded in short unilateral spikes forming a terminal unilateral panicle, not jointed at the base; rachilla continuous, glabrous. Glumes I and II unequal, scarious, lanceolate, acuminate or mucronate, keeled, empty, persistent; I 1-neived, II 1-3-nerved; fig. gls. rather longer, rigid, 5 nerved, subaristate, keel scabrid; palea 2-fid, keels ciliolate. Lodicules 2, 2-lobed, fleshy. Stamens 3, anthers long. Styles free, terminal stigmas plumose. Grain oblong, acute, trigonous, dorsally

subcompressed, ventrally channelled, glabrous.—Species few, Europe temp. Asia and Africa.

D. glomerata, Linn. Sp. Fl. 86; leaves keeled, sheaths compressed, ligule long laciniate, panicle erect or inclined, branches short or the lower long erecto-patent naked below, spikelets 3-5-fld., keels of flg. gls. ciliate-scabrid. Beauv Agrost. 85, t. 17, f. 5; Fl. Dan t. 743; Host Gram Austr. ii. 67, t. 94; Kunth Enum. Pl. i. 386, Suppl. 320, t. 29, f. 1; Engl. Bot. t. 335; Knapp Gram. Britt. t. 62; Reuchb. Ic. Fl Germ. t. 59 (excl. f. 1520), T. Nees Gen. Fl. Germ. Monocot i. n. 65; Webb. Phytog. Canar. t. 249; Wall. Cut n. 8899; Duthie Grass. N.W. Ind. 39; Ledeb. Fl. Ross. iv. 355; Boiss. Fl. Orient. v. 596. Festuca glomerata, All. Fl. Pedem. ii. 252.

NORTH-WESTERN HIMALAYA from Kashmir to Kumaon, and WESTERN TIBET, alt. 8-10,000 ft.—DISTEIB. Europe, N Africa, W. and N. Asia (an alien elsewhere).

Stem 2-3 ft. from a short creeping stock, smooth. Leaves subglaucous, glabrous or hairy towards the base, margins scabrid, sheath much flattened or 2-edged. Panicle 1-6 in., strict, green or purplish; lower branches sometimes 2-3 in. long. Spikelets \(\frac{1}{2}-\frac{1}{4}\) in., ovate; gls. I and II pale with green nerves, subaristately acuminate, terminal fig. gl sterile.—There are many synonyms of this common variable European plant, but the whole genus must be studied before the species can be disentangled.

#### 115. SCLEROCHLOA, Beauv.

A small annual prostrate grass. Spikelets minute, 3-6-fid., compressed, biseriately crowded on the branches of a secund subspiciform panicle; rachilla thickened under the fig. gls. Glumes 5-8; I and II very unequal, membranous, concave, emarginate, empty, persistent, I 3-nerved; II 5-8-nerved, unequal-sided; fl. gls. larger, complicate, keeled, strongly 5-nerved, tip obtuse, margins hyaline; palea hyaline, 2-fid. keels spinulosely ciliate. Lodicules 2, hyaline, ovate, 2-4-toothed. Stamens 3. Styles short, free, stigmas plumose. Grain oblong, free, subconcavo-convex, glabrous, tip 2-fid.

S. dura, Beauv. Agrost. 98, t. 14, f. 4; Reichb. Ic. Fl. Germ. t. 58; Ledeb. Fl. Ross. iv. 367; Boiss. Fl. Orient. v. 635; Griseb in Goett. Nachr. (1863) 293. Poa dura, Scop. Fl. Carn. i. 70; Host Gram. Austr. ii. 53, t. 73. Sesleria dura, Kunth Revis. Gram. i. 110, Enum. Pl. i. 323, Suppl. 278. Cynosurus durus, Linn. Sp. Pl. 72; Pollich Hist. Palat i. 98, Fig. 1. Eleusine dura, Lamk. Illust. i. 203. Festuca dura, Vill. Hist. Pl. Dauph. ii. 94. Amblychloa dura, Link in Linnæa, xvii. (1843) 399.

Kashmir Valley, alt. 5000 ft., Thomson.—DISTRIB Europe, N. Asia.

Stems 4-6 in., tufted, compressed, leafy throughout. Leaves linear, acute; sheath open; ligule oblong. Panucle 1-2 in., ovate-oblong, rigid, green; pedicels very short, stout, trigonous. Spikelets \(\frac{1}{4}\)-\(\frac{1}{4}\) in., spreading or appressed to the rachis; gl. I ovate-oblong, obtuse, keeled, margins hyaline; II twice as long; fig. gls. ovate-oblong, herbaceous, compressed above; palea shorter, oblong.

#### 116. SCHISMUS, Beauv.

Small annual grasses. Leaves narrow. Spikelets many-fid., in a subspiciform panicle, with very short erect branches and pedicels, not jointed

at the base; rachilla elongate, jointed at the base and between the fig. gls. Glumes 6-10; I and II large, empty, subequal, lanceolate, acute, concave, persistent, herbaceous, margins scarious, I broadest, 5-7-nerved; II 3-nerved, fig. gls. much shorter, oblong or obovate, 2-fid, many-nerved, mucronate or not between the hyaline lobes, palea spathulate with 2 submarginal diverging basal nerves. Lodicules 2, hyaline, truncate Stamens 3, anthers minute. Styles terminal, long, stigmas plumose. Grain minute, broadly obovoid, compressed, free.—Species 2 or 3, Europ. Asia. N. Africa.

S. marginatus, Beauv. Agrost 74, t. 15, f. 4; Kunth Enum Pl. i. 385, Suppl. 318, t. 28, t. 2; Ledeb. Fl. Ross. iv. 403; Duthee Grass N.W. Ind. 39. S. calycinus, C Koch in Linnea xxi. (1848) 397; Coss. & Dur. Expl. Sc. Alger. 138, in Bull Soc. Bot. Fr. iv (1857) 399, Boiss. Fl Orient v. 599 S hisutus, Trin. Fund Agrost 148. Festuca calycina, Loefl It. Hispan. 116; Cav Ic 1. 88, t. 44, f. 2, Lamk Illustr t. 46, f. 5. Koeleria calycina, DC. & Duby. Bot. Gall. Suppl. 271. Hemisacris gonatodes, Steud in Flora, xii. (1829) 490. Electra calycina & nitida, Panz. in Muench. Denkschr. iv. (1813) 299 cum Ic. Trisetum Loeflingianum, Duthee Grass. N.W. Ind. 31 (non Beauv.).—Griff Notul. 96 (gramen pusillum, &c.), Ic Pl. Asiut t. 154, f. ii.

UPPER PUNJAB; Peshawur, Stewart. Western Tibet, alt 9-11,000 ft, Nubra and Dras, Thomson, Iskardo, Clarke.—Distrib. Westwd. to the N. Atlantic, N. Asia.

Stems 2-8 in., densely tufted, filiform. Leaves glabrous or sparsely hairy,  $\frac{1}{10}$  in broad; ligule of hairs. Panicle  $\frac{1}{2}$ -2 in., green, glistening, pedicels scabrid. Spikelets  $\frac{1}{4}$  in., gl. I and II glabrous; fig. gls. hairy, cleft to about  $\frac{1}{4}$  of their length; lobes ovate, acute.

#### 117. BRIZA, Linn.

Annual or perennial erect grasses. Leaves flat or convolute. Spikelets many-fld., laterally compressed, pendulous, in lax rarely contracted or spiciform panicles not jointed on the pedicel; rachilla jointed at the base. Glumes many, scarious, cymbiform or saccate, closely imbricate; I and II subequal, empty, 3-5-nerved, persistent; fl. gls. broader, obtuse acute or shortly awned, 5- or more-nerved, terminal often empty or imperfect; palea often small, broad, flat, hyaline, 2-nerved. Lodicules 2, ovate-lanceolate. Stumens 3. Styles free. Grain ovoid, dorsally compressed, closely invested by the palea.—Species about 10, of temperate regions.

B. maxima, Linn., has been found as an escape in several parts of India. It may be recognized by the very large spikelets. B. minor, L, with very small spikelets may be also expected to occur.

B. media, Linn. Sp. Pl. 70; perennial, panicle erect, branches spreading, spikelets ovate 5-9-fld., gl. I and II shorter than III. Fl. Dan. t. 258; Host Gram. Austr. ii. t. 29; Knapp Gram. Britt. t. 60; Engl. Bot. t. 340; Trin. Sp. Gram. Ic. t. 291; Reichb. Ic. Fl. Germ. 1. t. 92, T. Nees Gen. Fl. Germ. Monocot. 1. n. 59, Kunth Enum Pl. 1. 371, Suppl. 307, t. 25, f. 2; Ledeb. Fl. Ross iv. 365; Boiss. Fl. Orient. v. 592; Duthie Grass. N.W. Ind. 39.

WESTEEN HIMALAYA; from Kashmir to Garwhal, and WESTEEN TIBET, alt. 9-13,000 ft. Sikkim, at Gnatong, Cummins.—Distrib. Europe, N. Asia. (An alien elsewhere.)

Stem 1-3 ft., very slender, creeping below and stoloniferous. Leaves flat, smooth or scaberulous; sheaths smooth, upper inflated; ligule short. Panicle pyramidal; branches long, capillary, horizontal. Spikelets  $\frac{1}{4} - \frac{1}{3}$  in., green or purplish, shining, orbicular-ovate; fl. gls. cordate, imbricate.

### 118. **POA**, *Linn*. (by O. Stapf).

Annual or perennial grasses. Leaves flat or convolute. Spikelets 2-6-fid., in lax or close rarely spiciform panicles, laterally compressed; rachilla jointed at the base and between the fig. gls., glabrous or sparsely hairy, upper fl. usually imperfect. Glumes 4 or more, acute or obtuse, usually thinly herbaceous; I and II empty, persistent, 1-3-nerved, keeled; fig. gls. obtuse or acute, 5-7-very rarely 3-nerved, nerves conniving towards the top, callus often bearded with long wool; palea shorter than the gls, 2-keeled. Lodicules 2. Stamens 3. Styles short, free, stigmas plumose. Grain ovoid oblong or linear, free or adherent to the palea. -Species about 80, temperate and cold regions, rarely tropical.

The Indian Pone have been worked up by Dr. Stapf, who has kindly given me his mss., from which the characters given below are taken. The nomenclature agrees closely with that of Hackel in a very extensive series of North Indian grasses collected by Mr. Duthie. The names of early distributed collections including those of Dr. Thomson and myself were given by Genl. Munro after a cursory examination, and should be disregarded.

Subgen. I. PSEUDOPOA, C. Koch. Fl. gls. 3-nerved, often very faintly.

1. P. persica, Trin in Mem. Acad. Sc. Petersb Ser. VI. i. (1831) 373; Kunth Enum. Pl. i. 358; Boiss. Fl. Orient. v. 610; Steud. Syn Gram. 255. P. parvula, Herb. Un. Itin. ex Steud. l c. P. pamphylica, Boiss. Diagn. Ser I. xiii 58. Nephelochloa persica, Griseb. in Ledeb. Fl. Ross. iv. 366, in Goett. Nachr. (1868) 74. Festuca persica, heptantha, & polygama, C. Koch in Linnæa, xxi. (1848) 409, 410. F. Amherstiana, Royle Ill. Himal. Bot. 417 (name only).—Poa, n. 19, 20, Herb. Ind. Or. H. f. & T.

WESTERN HIMALAYA; from Kunawur to Kashmir and WESTERN TIBET, alt. 7-12,000 ft.—DISTRIB. Westwd. to Asia Minor, Soongaria, Altai Mts.

A very slender erect, quite glabrous, usually flaccid annual, 1-18 in. high, most variable in habit; from a simple capillary stem with few-fld contracted panicle, to a tall strict herb, with a pyramidal or oblong copiously branched panicle 6-8 inches long, and sometimes 6 in across the spreading branches. Leaves narrowly linear, rarely ; in. diam., quite smooth, flat; ligule lauceolate. Panicle-branches 2-9 in a whorl, pedicels capillary, often very long and divaricate. Spikelets  $\frac{1}{10} - \frac{1}{6}$  in long. 2-15-fid, green, rachilla slender; gls. I and I lanceolate, acumulate, I very small, II 3-nerved; fig. gls. longer than II, linear-oblong, acute acuminate or obtuse and mucronate, smooth or obscurely puberulous, tip and margins more or less broadly scarious and shining; palea 2-toothed, keels scaberulous. Lodicules ovate-oblong. Anthers minute. Grain narrow, linear, subadherent.

The following are divergent forms with many intermediates of this extremely variable grass. In India they do not seem to affect special localities. All seem to

occur in Western Tibet, where the plant is very abundant

P. PERSICA proper; rather tall, spikelets many-fid., fl. gls. acute or acuminate

very narrowly scarious.

Var. soongarica; spikelets 1-3-fld., flg. gls. acuminate, margins broadly scarious. var. oxymeris, Boss. Fl. Orient. l.c. P. soongarica, Boss. l.c. 611. P. paradoxa & P. subtilis, Kar. & Kir. in Bull. Soc. Nat. Misc. (1841) 464, (1842) 532. P. diaphana (error for diaphora), Trin. in Bull. Sc. Acad. Petersb. i. (1836) 69.

Nephelochloa altaica & soongarica, Griseb. in Ledeb. Fl. Ross. iv. 367. Glyceria soongarica, Schienl. in Fisch & Mey. Enum. Pl. Schienk 1. 1. Aira altaica, Trin. in Bunge Verz. Suppl. Fl. Altaic. 8

Var alpina, Boiss. l. c. 610; 1-2 in. high, fastigiately branched, panicle depressed amongst the leaves, rachis short, branches crowded spreading subsquarosely and decurved, spikelets 2-3-fld. fl. gl. acute. Var. minor, Boiss. in Bourg. Pl. (1990)

Lycia (1860).

Var major, Boiss. l c., tall, panicle spreading, spikelets few or many-fld, flg gls. truncate or rounded at the tip mucionate, margins very nationly scarious Nephelochloa tripolitana, Boiss. & Blanch. Diagn. Ser. II. iv. 133.

Subgen. II Euroa. Flg. gls. 5-nerved, lateral pairs sometimes obscure.

- \* Stem bulbously thickened at the base.—§ Arenariæ.
- 2. **P. bulbosa**, Linn Sp Pl. 70, var. elanata, Stupf; densely tutted, leaves linear acute flat, ligule ovate or oblong, panicle oblong, lower branches binate, spikelets \(\frac{1}{2}\)-\frac{1}{4}\) in. 4-7-fld. subsessile crowded often viviparous, gl. I ovate acute margin broadly hyaline, flg. gls. oblong acute, upper \(\frac{1}{2}\)-\frac{1}{3}\) hyaline silkily hairy below the middle, nerves obscure, wool 0 or very scanty, keels of palea scabrid. P bulbosa, Duthie Grass. N.W. Ind. 40; Griseb in Goett Nachr. (1868) 74

WESTERN HIMALAYA; from Kashmir to Zanskar, alt. 5-9000 ft., Falconer, &c. WESTERN 'I IBET, alt 9-13,000 ft. DISTRIB. (of P. bulbosa) temp. Europe and Asia.

Stems 6-16 in., tereté, smooth. Leaves chiefly subradical, margins smooth, shortly acute, lower 2-2\frac{2}{3} in., upper much shorter, \frac{1}{6} in. broad, of the surcul very marrow; sheaths lax, often open, upper more appressed shorter than the internodes; ligule \frac{1}{3}-\frac{1}{6} in., or shorter in reduced forms Panicle 1-2 in., rarely ovate, lobed, contracted, lower branches nearly smooth; branchlets short, scaberulous. Spikelets shortly pedicelled or subsessile, oblong or ovate-oblong, pale green; gl. I \frac{1}{12}-\frac{1}{6} in. ovate, acute, 3- rarely 2-nerved, margins denticulate, nerves rough; II similar but larger, more acuminate, 3-nerved; fl. gls. \frac{1}{3}-\frac{1}{6} in., oblong, acute, sometimes mucronulate, upper \frac{1}{1-3} in yaline; nerves obscure; palea \frac{1}{6} shorter. Anthers \frac{1}{13}-\frac{1}{13} in.—Differs from typical bulbosa in the absence or scantiness of wool in the spikelets. Kashmir specimens are unusually tall and stout, with many broad leaves and sometimes a laxer habit. Zanskai ones are typical in all respects but the absence of wool. The viviparious state is very common.

- \*\* Stem not bulbously thickened at the base.
- + Spikelets broadly ovate, gls. thin, broad, doisally strongly arched, fl. gl base silkily hairy, wool 0.—§ Alpinæ
- 3. **P. alpina**, Linn. Sp Pi. 67, densely tufted, surculi clothed with short districtions thickish sheaths, leaves short broadly linear firm acute, panicle broadly ovate, lower branches mostly binate, spikelets  $\frac{1}{6} \frac{1}{4}$  in. 3-6-fid. broadly ovate, gls. all thin arched, I ovate acute margin broadly hyaline, fig. gls ovate-oblong obtuse upper  $\frac{1}{3}$  hyaline silky-harry below the middle nerves obscure, wool 0, keels of palea ciliate below the middle. Host Gram. Austr ii. 49, t 67; Engl. Bot. t. 1003, Knapp Gram. Britt. t. 50; Reichb Ic. Fi Germ t. 83, Ledeb. Fl. Ross. iv. 370; Boiss. Fl. Orient. v. 605, Griseb. in Goett Nachr. (1868) 74; Duthre Grass. N.W. Ind. 40.

WESTERN HIMALAYA and WESTERN TIBET; from Kashmir to Garwhal, alt 10-16,000 ft.—DISTRIB. N. temp. and Arctic regions.

Stem 4-16 in., terete, smooth. Leaves chiefly crowded at the base of the stem; rarely more than  $\frac{1}{6}$  in. bload, flat or of the surculi plicate, firm, margins rough; lowest sheaths and of the surculi distichous, the thickened bases enclosing the stem, upper

much longer, up to 2-4 in., smooth, open or not, uppermost remote from the panicle; ligule of the lower and of the surculi very short, truncate, ciholate, of the upper longer, ovate, sparingly coarsely denticulate. Panicle up to  $2\frac{1}{2}$  by 2 in., lax or dense, lower branches more or less spreading, usually naked in the lower half; branchlets short, scaberulous Spikelets crowded, usually parti-coloured, the lower shortly upper longer-pedicelled; gls. thin, I  $\frac{1}{2}$  in., 3-nerved, lateral nerves taint or one obsolete, margins subentire, keel rough; II similar, but rather broader; fl. gls  $\frac{1}{3}-\frac{1}{2}$  in., often emarginate, palea hardly shorter, keels cliate below the middle, serrulate above it. Ainthers  $\frac{1}{12}$  in., oblong.

- †† Spikelets narrower, gls. all or fig. especially firmer, I and II lanceolate or oblong-lanceolate.
- a. Gls. all firm, I & II acute or subacuminate, I 1- or sub 3-nerved; unthers  $\frac{1}{15}$ ,  $\frac{1}{12}$  in.—Rather tall robust or subrobust species, stoloniferous when flg.; stems smooth —§ Pratenses.
- 4. **P. tibetica,** Munro ex Duthne Grass. N.W Inil 41; tall, stout. stoloniferous, leaves linear acute firm, ligule short truncate, panicle contracted or spiciform, lower branches 2-4-nate unequal smooth, spikelets  $\frac{1}{5}$ - $\frac{1}{4}$  in 4-6-fid. pedicelled crowded pale. gl I ovate-lanceolate margin hardly hyaline, II ciliate on the margins towards the base, fl gls oblong, tips only hyaline, keel alone silkily hairy, lateral nerves obscure, wool 0.

WESTERN TIBET, alt. 9-16,000 ft; Piti, Jacquemont; saline plains of Ladak, &c., Thomson. Plains of Tibet N. of Kumaon, alt. 15,000 ft., Strachey &

Winterbottom (Poa, n. 1.)

Stem 12-20 in, stout, terete, smooth, closely sheathed below, 1-2-leaved much below the panicle. Leaves, lower 8 in., upper 2-3 by  $\frac{1}{3}-\frac{1}{3}$  usually plicate, glabious, smooth; sheaths firm, upper very long, smooth; ligule  $\frac{1}{12}$  in, firm, cholate. Panicle about  $\frac{1}{4}$  in long, narrow, interrupted; lower branches 2-nate, the longer appressed to the rachis, and branchlets smooth Spikelets crowded, all pedicelled, oblong, pale; gls firm, I  $\frac{1}{3}-\frac{1}{4}$  in., subacummate, sub 3-nerved, keel minutely scaberulous, margins hardly hyaline; II rather larger, more oblong; fl gls.  $\frac{1}{4}-\frac{1}{4}$  in., subacute, chiate on the margin towards the base, lateral nerves obscure; palea rather shorter, keels subservulate. Anthers  $\frac{1}{10}$  in, linear.

Var. aristulata, Stapf; gls. more acuminate often very shortly aristulate.-

Eastern Tibet, N. of Sikkim, alt. 16-17,000 ft.-J. D. H.

5. P. pratensis, Linn Sp. Pl. 67; tall, stout, stoloniferous, leaves usually flat acute upper much the shortest, ligule truncate or subobovate, panicle ovate or oblong lower branches usually 5-nate, spikelets  $\frac{1}{6}-\frac{1}{6}$  in 3-5-fld. ovate acute crowded green, gl. I ovate-lanceolate acute, fig. gls. oblong upper  $\frac{1}{3}-\frac{1}{6}$  hyaline nerves prominent, keel and lateral nerves silkily hairy to the middle or above it, wool copious, keels of palea scabrid-serrate—

Host Gram. Austr. ii. 44, t. 61; Engl. Bot. t. 1073; Knapp Gram Britt. t. 55; Kunth Enum. Pl. 1. 352, Suppl. 297; Steud. Sym. Gram. 251; Revchl. Ic. Fl. Germ t. 88, T. Nees Gen. Fl. Germ. Monocot. 1. n. 56; Ledeb. Fl. Ross. iv. 378; Boiss. Fl. Orient. v. 601; Griseb. in Goett. Nachr. (1868) 74; Duthie Grass. N.W. Ind. 40. P. alpina, Griseb. l. c. (Herb. Schlagintw. n. 2772.)

WESTERN HIMALAYA; from Kashmir to Kumaon, and WESTERN TIBET, alt.

5-15,000 ft. BHOTAN, Griffith - DISTRIB. North temp. regions.

Stems 6-20 in., smooth, terete. Leaves crowded at the base of the stem, linear, rarely plicate or subinvolute, firm (flaccid in shade), margins asperulous, glabrous or rarely sparsely hairy, lower very variable in length, upper  $\frac{1}{2}$ —I in. by  $\frac{1}{20}$ — $\frac{1}{6}$  in ; lowest sheaths firm, close; upper much longer, 4 in. and upwards, smooth, ligule rarely more

than  $\frac{1}{12}$  in. Panule up to  $4\frac{1}{2}$  in., lax or contracted; lower branches rarely 2-3-nate, erect or spreading, naked below or rarely branched to the base, smooth or asperulous. Spikelets shortly or terminal longer-pedicelled, green; gl. I  $\frac{1}{12} - \frac{1}{10}$  in., 3- or 2-1-nerved, keel asp rulous, margins hyaline denticulate; II rather larger, 3-nerved; gls.  $\frac{1}{3} - \frac{1}{2}$  in., acute, nerves prominent; palea shorter. Anthers  $\frac{1}{15} - \frac{1}{12}$  in. linear.— There are many forms, characterized by narrow almost setaceous or by very short leaves, by very narrow and contracted panicles, by shorter spikelets, or by various combinations of these characters; but these are all so intricately connected, and in many cases so evidently the product of conditions of habitat, and are so independent of geographical distribution, that it is impossible to define them satisfactorily. The two extreme forms are—

Var. angustifolia, Sm. Fl. Bitt. 1. 105; Gaud. Agrost. Helvet. i. 214; leaves extremely narrow often setaceous. P. angustifolia, Linn. Sp. Pl. 67. P. strigosa, Hoffm. & setacea, Hoffm. P. compressa & trivialis (in part) Herb Ind. Or. Hf. & T.

-Occurs with the type and passes directly into it.

Var alpigena, Blytt Norg. Flora, 130; stem 3-8 in., leaves short plicate, ligule  $\frac{1}{2}$ ,  $\frac{1}{2}$ , in., panicle  $\frac{3}{4}$ - $\frac{1}{2}$  in ovate, lowest branches solitary or 2-5-nate glubrous more or likely specially specially

6. **P. pseudo-pratensis**, Hook f.; stem tall stoloniferous, leaves acute or acuminate usually plicate lowest usually shortest, ligule ovate acute or truncate, panicle ovate or oblong lax-fid lower bianches usually binate branches very long flexuous scaberulous, spikelets  $\frac{1}{4}$ — $\frac{1}{2}$  in. 3-2-fid., gl. I ovate-oblong acute margin hardly hyaline, fig. gls. oblong tips alone hyaline base silkily harry nerves promunent wool scanty or 0, keels of palea ciliate below.—Festuca, Wall. Cat. n. 3798 (partly). P. pratensis & P. flexuosa  $^{9}$  Herb. Ind. Or. Hf. & T. (in part)

CENTRAL & EASTERN HIMALAYA; Nepal, Wallich; Sikkim and W. Bhotan, alt. 10-12,000 ft, J.D.H., Cummins.

Stems 8-20 in., smooth, terete. Leaves crowded at the base of the stem, 1-3½ by ½ in., lowest shorter, cauline far distant, of the surculi longer, linear, gradually narrowed into the sheath, glabrous smooth or minutely scaberulous; lowest sheaths short, firm, scarious, loose, upper much longer up to 6 in., membranous, smooth; ligule  $\frac{1}{1}$ ; in. Panicle up to 8 in , branches 3-5-nate, about 2-3 in. long, naked except towards the ends, all spreading or suberect, flexuous, smooth or asperulous, branchlets rough. Spikelets  $\frac{1}{4}$ —1 in , blueish, crowded, shortly or the terminal longer-pedicelled, ovate-oblong; rachilla pilose; gls. firm, I  $\frac{1}{2}$  in , 1-nerved, with rarely a lateral pair, keel roughish, margins minutely denticulate; II rather larger, more acuminate; fl. gls.  $\frac{1}{6}$ — $\frac{1}{6}$  in., oblong, acute, tip spotted with yellow, keel and outer nerves silky beyond the middle, intermediate at the base only; palea rather shorter, ciliate below, and scabridly servulate above or in the whole length. Anthers  $\frac{1}{16}$ — $\frac{1}{16}$  in., linear

- $\beta$ . Glumes all, or the fly especially somewhat firm, I  $\S$  II acuminate, I always distinctly 3-nerved; anthers  $\frac{1}{25}-\frac{1}{12}$  in —Low or more often tall slender species, stems when flowering surrounded by buds or short stolons, or fascicled with longer stolons.— $\S$  Nemorales.
- 7. P. attenuata, Trun in Bunge Verz. Suppl. Fl. Alt. 9; stems tufted erect rigid 1-2-leaved above, leaves narrowly linear plicate or involute, sheaths white scarious, ligule ovate, panicle contracted dense-fld., lower branches solitary or 2-nate short appressed scaberulous branching from

the base, spikelets 1 1 1n. 2-5-fld. subsessile, gl. I ovate-lanceolate acuminate margins narrowly hyaline, fig. gls. sparsely hairy below, wool 0 or scantv. Ledeb. Fl Ross. 1v 371; Boiss. Fl. Orient. v. 608. P. attenuata & P. altaica, Griseb. in Goett. Nachr. (1868) 74. P. laxa, Duthie Grass. N.W. Ind. 40. P. laxa & trivialis partim Herb. Ind. Or Hf. & T. P. flexuosa y humilis, Herb. Royle. P. sterilis, Bieb ex Duthie l.c.

ALPINE HIMALAYA & WESTERN TIBET, alt. 13-17,000 ft -DISTRIB Persia,

Turkestan, N Asia.

Stems 4-6 m., densely tufted, not stoloniferous, bearing axillary surculi. Leaves 1-2 by 1/15 in , firm, smooth or nearly so; lower sheaths mostly scarnous, white, upper up to 2 in; hgule  $\frac{1}{1}$ , in., acute Panicle  $\frac{1}{3}$ - $\frac{1}{4}$  in, strict, continuous or sub-interrupted, lower branches larely 3 nate,  $\frac{1}{2}$ - $\frac{3}{4}$  in, erect, often stout Spikelets green, often vallegated; gls. close together, firm, I hardly  $\frac{1}{4}$  in. 3-nerved, keel nearly smooth or roughish; II rather longer, broader in the middle; fig. gls. 1 in, oblong, upper 1 hyaline, minutely scaberulous, tip usually erose; nerves 5, slender, obscure, keel and outer nerves silky at the very base only or subglabrous, rarely with longer hairs; palea rather shorter, keels serrulately scabrid. Anthers in —Grisebach's P. altaica (Goett Nachr. l.c.) is a stunted depauperate form.

8. P. nemoralis, Linn. Sp. Pl. 69; stem not stoloniferous when fig., but bearing at the base surculi or leaf-buds 2-4-leaved above the base smooth or scaberulous, leaves very narrowly linear, ligule very short ovate or longer and oblong, panicle contracted or open, lower branches usually binate usually branching to the base and branches scaberulous. spikelets 1-1 in. long-pedicelled 2-1-fid., gls. crowded I ovate-lanceolate acuminate margins hyaline, fig. gls oblong upper 1 or 1 hyaline nerves obscure and keel at the base silky-hairy, wool 0 or scanty, keels of palea scaberulous. Fl. Dan. t 709, Engl. Bot t. 1265; Host Grum. Austr. ii. 5, t 71; Reichb. Ic. Fl. Germ. t. 86; Steud. Syn Gram. 251, Ledeb. Fl. Ross. iv. 375; Borss. Fl Orrent. v. 607; Duthie Grass. N.W. Ind. 40.

TEMPERATE & ALPINE HIMALAYA & WESTERN TIBET, alt. 5-15,500 ft .-

DISTRIB. Europe, N. Asia, N. Am.

Stem 1-2 ft., erect, rigid or flaccid, smooth or scaberulous above, lower internodes hidden in the sheaths or nearly so, uppermost more or less exserted. Leaves cauline 2-5 by 1 m., flat plicate or involute, firm or flaccid, erect or spreading, smooth or minutely scaberulous above; sheaths appressed, uppermost up to 4 in.; ligule truncate, up to 1/8 in., often erosely denticulate. Panicle lax, rigid flexuous or flaccid, lowest branches solitary to 3-nate, slender, erect or spreading, asperulous. Spikelets loosely disposed, green or variegated; rachilla smooth scaberulous or pilose; gls. close or rather distant, firm or rather thm, I 1-1 in., 3-nerved, keel loughish, margins narrowly or broadly hyaline; II rather longer and broader; fig. gls.  $\frac{1}{8}$  in., subobtuse (or subacute in profile) upper  $\frac{1}{n-\frac{1}{4}}$  hyaline and sometimes erose, nerves 5, slender, interspaces sometimes puberulous; palea rather shorter. Anthers 10-10 m.—An extremely variable species in habit and length of ligule especially, which is usually short in European examples. The form with a long ligule forms a link with P. attenuata, Trin , which has usually a more contracted habit. Most of the described varieties of nemoralis are also Indian.

Var. Innai, Stapf; ligule very short about 10 in. long.-From Kashmir to

Kumaon, alt 5-9000 ft., rarely higher.

Var. legulata, Stapf; ligule elongate 1 in. P. attenuata, Greseb. in Goett. Nachr. (1868) 75. (Schlagintu. n. 2791) P. botryoides (Schlag. 7068, 7196). P. flexuosa, Herb. Royle, & Strach. & Winterb. n. 7. P. laxa, Herb. Ind. Or. Hf. & T. (the Silkem plant). P. serotina, var. botryoides, Griseb. l.c. (Herb. Schlag. n. 7562). P. variegata, Jacquem. mss. (partim).—From Kashmir to Sikkim, alt. 7-15,000 ft.

- $\gamma$ . Glumes all thin, I & II acute or subacute, I1-nerved or with a very slender 2nd, anthers  $\frac{1}{12} \frac{1}{4}$  in.—Stem slender, densely computes with fascicled basal survult, or more loosely & stoloniferous; panicle slender, branches apillary.—§ (flareose.
- 9. **P. polycolea**, Stapf; stems fascicled wiry smooth, leaves narrowly linear or subsetaceous, lower sheaths very lax white scarious, ligule very short, panicle contracted or effuse, lower branches 2-5-nate capillary, branchlets and pedicels long, spikelets  $\frac{1}{1-\frac{1}{4}}$  in loosely 3-fid. gI I acute or subscute margins hydrine, fig. gls. oblong upper  $\frac{1}{4-\frac{1}{4}}$  hydrine, nerves and keel sparsely silky harry or glabrous, keels of palea minutely scabrid. P. serotina, Herb. Strach. & Winterb. n. 11. Poa n. 15, Herb. Incl. Or. Hf. & T.

WESTERN HIMALAYA; from Kashmir to Kumaon, alt. 8-12,000 ft

- Stem 6-12 m, erect or ascending, rather strict, lowest internodes loosely sheathed, uppermost rather far exserted. Leaves lower 8 in., long-acuminate, flat or more or less convolute, subflaccid, glabrous, smooth or margins and nerves beneath apperalous; uppermost sheaths up to  $3\frac{1}{2}$  in. Panicle  $2\frac{1}{3}$ -4 in , pyramidal, rigid or flaccid, lowest branches 2-3 in , flexuous, lower  $\frac{1}{2}$  or  $\frac{1}{3}$  naked, then loosely branched; branches rather long, roughish; pidicels of spikelets up to  $\frac{1}{2}$  in. Spikelets loosely disposed, oblong, bright green or variegated; gls. thin, I  $\frac{1}{3}$ - $\frac{1}{6}$  in , lanceolate, 1-nerved, keel roughish, II longer, oblong, 3-nerved; flg. gls.  $\frac{1}{4}$ - $\frac{1}{6}$  in., acute or subacute; nerves slender, prominent or obscure, outer and keel glabrous or sparsely silky; wool 0 or hardly any; palea rather shorter. Lodicules unequally 2-lobed. Anthers  $\frac{1}{4}$ -in , linear.
- 10. **P. Falconeri**, *Hook. f.*; stem tall leafy, leaves narrowed from the middle scaberulous above and beneath, upper equalling or exceeding their sheaths, ligule ovate, panicle narrow very lax, lower branches binate, spikelets  $\frac{1}{3}$ — $\frac{1}{4}$  in 2-3-fid., gl. I oblong-lanceolate acute, II subobovate-oblong, fig. gls. acute or subacute tip shortly hyaline, nerves obscure sparingly pubescent, wool 0, keels of palea finely serrulate.

WESTERN HIMALAYA, Falconer; Gurwhal, alt. 12-13,000 ft. Duthie (n. 288).

- Stem 2-2½ ft., erect, smooth, terete, 4-5-leaved above the base; internodes short, or the upper more or less elongate and exserted. Leaves about 6 by  $\frac{1}{6}$  in., subflaccid, linear, glabrous, flat or subplicate, upper about equalling their sheaths; lower sheaths lax, upper adpressed, film, uppermost 3-6 in.; ligule  $\frac{1}{12} \frac{1}{6}$  in. Panicle about 4 in , narrow, very lax, flexuous and flaccid; lower branches flexuous, erect, sparingly and loosely again branched, smooth or nearly so, branchlets roughish. Spikelets as long as or shorter than their pedicels, oblong, green or purplish below, gls. thin,  $\frac{1}{6} \frac{1}{6}$  in, 1-nerved, margin broadly hyaline, keel minutely asperulous; II rather longer, 3-nerved; fig. gls.  $\frac{1}{2}$  in , oblong, nerves very slender, pilose on the side at the base only; palea rather shorter than the gl. Lodicules unequally 2-fid. Anthers about  $\frac{1}{10} \frac{1}{6}$  in.
- 11. **P. flexuosa**, Wahlb Fl. Carp. 22. Fl Succ. 57 (exparte); stems usually very slender tutted stoloniferous, leaves narrowly linear acute or acuminate flat plicate or involute, cauline sometimes deflexed, panicle pyramidal lax, lower branches 2- rarely 3-nate or solitary, branches and pedicels scaberulous, spikelets  $\frac{1}{6}$ -1 in 2-3-fld., gls. thin I oblong-lanceolate 1-3-nerved margin broadly hyaline, II rather longer, fl. gls. broadly oblong upper  $\frac{1}{4}$  or  $\frac{1}{5}$  hyaline base shortly silky-hairy, nerves obscure or slender and prominent, wool scanty or 0, keels of palea scabrid. Reschenb. Ic. Fl. Germ. t. 84; Blytt Norg Fl. 126. P. cenisia, Duthie Grass. N.W. Ind. 40; PGriseb in Goett. Nachr. (1868) 75. P cenisia, var.  $\beta$ . flexuosa, Hartm.

Handb. Skand. Fl. 262; Anders. Gram. Skand. t. 4, f. 41. P. flexuosa, var. a. effusa, Herb. Royle.—Poa No. 9, Herb. Strack. & Winterb.—Poa No. 7, & P. flexuosa (of Sikkim), Herb. Ind Or. Hf. & T)

ALPINE HIMALAYA, alt. 10-17,000 ft., from Kashmir to Sikkim.—DISTRIB. N. temp. and Arctic regions.

Stem 8-16 in., erect or with the branches geniculately ascending, smooth; lowest internodes short, laxly or closely clothed with short sheaths, the following 2-4 elongate, uppermost exserted. Leaves 2-5 by  $\frac{1}{20}$  in., glabrous, smooth or nearly so, flaccid or rather firm; lower sheaths scarous, uppermost about 4 in.; ligule 12-1 in, ovate. Panicle 2-4 in., erect or inclined; lower branches capillary, flexuous, often spreading or deflexed, naked except towards the tips smooth. lets shortly or the terminal longer pedicelled, green, generally suffused with purple; gl I  $\frac{1}{8} - \frac{1}{4}$  in , sub-obtuse or -acute, margins broadly hyaline, keel smooth or roughlish; II rather longer, ovate-oblong, sub-obtuse, 3-nerved, lateral nerves often short; fig. gls.  $\frac{1}{6} - \frac{1}{5}$  in., nearly glabrous or keel and nerves at the base silky, smooth or minutely lough, palea rather shorter than the gl, dorsally most minutely puberulous between the keels Anthers 1 in , linear.

- 8. Glumes I & II thin, acute or acuminate, I 1-nerved, or with a very slender 2nd, rarely 3-nerved, anthers very minute, rarely  $\frac{1}{16}$  in. long.— Usually perennial, sometimes flg. in the first year, or truly annual; leaves & often stem flacerd; stems loosely tufted or on a slender rhizome & with more or less elongate lower internodes, hardly stoloniferous when flowering.— § Micrantheræ.
  - 1 Ligule very short; keels of palea serrulately scabrid.
- 12 P. khasiana, Stapf; stem slender erect or ascending, leaves linear long-acuminate, ligule very short truncate, panicle narrowly pyramidal, lower branches 3-5-nate and branchlets scaberulous, spikelets \$-\frac{1}{6} \div 1 in 3-4-fid., gls. rather distant, I oblong-lanceolate acute margins very narrowly hyaline, II ovate-lanceolate, fl. gls. minutely granulate, nerves prominent base nearly glabrous, wool copious or scanty, keels of palea scabrid.—Poa himalayana & Poa n. 17, Herb. Ind. Or. Hf. & T.

SIRKIM HIMALAYA, alt. 11-14,000 ft, J D. H., King's Collector. Khasia

Hills, alt. 4-6000 ft, J. D. H. & T. T., Clarke.

Stems loosely tufted, 1-2 it, subcrect from a rooting base, internodes 5-6, upper gradually longer, loosely or rather tightly sheathed, or the upper shortly exserted Leaves up to 4-6 by  $\frac{1}{12}$   $\frac{1}{10}$  in., flaccid, flat, smooth or margins roughish; sheaths smooth, uppermost up to 5 in., usually longer than the blade; ligule erose. Panicle 4-6 in. long, lax, sometimes subsecund; lower branches subrigid or flexuous, slender, at length spreading or deflexed, unbranched except the tips or loosely branched almost from the base. Spikelets ovate-oblong, pale green; gls. firm; I  $\frac{1}{8}$  in., 1-nerved, keel rough; II rather longer and broader, 3-nerved; fig. gls.  $\frac{1}{8}$ - $\frac{1}{8}$  in., oblong, obtuse, tip shortly hyaline, nerves 5 distant, keel and outer nerves sparsely silky or subglabrous. Anthers  $\frac{1}{26}$   $\frac{1}{20}$  in.—Differs from P annua var. sikkimensis in being taller, with leaves long-attenuate, ligule very short, branches of panicle 3-5nate, in the wool, and in the keels of the palea not ciliate; and from P annua var. nepalensis, in the 3-5-nate more flexuous branches, rather larger spikelets, narrower firmer gls. with more prominent nerves, rough keels of the palea and rather longer anthers

- II Ligule long; keels of palea ciliate.
- 1. Spikelets obovate; gl. I & II equalling the flg. or rather shorter.
- 13. P. hirtiglumis, Hook. f.; stem stout, lower internodes usually

short, upper elongate, lower sheaths lax scarious, leaves linear flat or plicate acute flaccid, panicle pyramidal, lower branches binate spreading or deflexed, spikelets in obovate 2-fld., fig. gls. broadly oblong obtuse, base copiously silky-hairy, wool 0, keels of palea long-ciliate. P alpina partly, & P. flexuosa, ?? partly Herb Ind. Or. Hf & T.

SIKKIM HIMALAYA, alt. 16-18,000 ft.; PLachoong Valley, alt. 11,000 ft., J. D. H.

Stems 8-12 m, from a slender evanescent rhizome, forming lax stoloniferous tufts with the surculi, smooth, terete; internodes mostly very short, the penultimate  $=\frac{1}{4}-\frac{1}{3}$  the stem, uppermost up to 6 in, exserted. Leaves 2-3 by  $\frac{1}{12}-\frac{1}{10}$  in., chiefly crowded towards the base of the stem, with 1-2 shorter higher up, or all short, glabrous, smooth with roughish margins; lower sheaths lax, scarious, upper up to 3 in , membranous, smooth; liquid  $\frac{1}{2} - \frac{1}{10}$  in., ovate, obtuse. Panicle up to 2 in., lax, lower branches 11 in. shorter, naked for most of their length, smooth, branchlets roughish. Spikelets shortly or the terminal longer pedicelled, loosely disposed or the terminal crowded, green or suffused with violet, rachilla pilose; gls. firm, I ½ in., acute, I-nerved, keel roughish; II rather larger, acute, 3-nerved; fig. gls. rather longer than II, upper & hyaline, nerves obscure. Lodicules unequally 2-lobed. Anthers 1 in., linear. Grain elliptic-oblong, laterally compressed.

- 2. Spikelets ovate or oblong; gls. I & II distinctly shorter than the fig.
- 14 P. himalayana, Nees ex Steud. Syn Gram. 256; stem tall erect or ascending slender weak, leaves linear flat long-acuminate rather flaccid, ligule ovate or oblong, panicle contracted or effuse, lower branches 2- rarely 3-4-nate long capillary flexuous, spikelets  $\frac{1}{8}$ - $\frac{1}{6}$  in. 3-4-fid., gls. distant, gl. I lanceolate acuminate margin hardly hyaline, fig. gls. narrow tip alone hyaline, base scantily silky-hairy, keels of palea long-ciliate. Duthie Grass. N.W. Ind. 40.—Deschampsia, Wall Cat. n. 8885.—Poa n. 18, Herb. Ind. Or Hf. & T.

TEMPERATE & ALPINE HIMALAYA, from Kashmir to Bhotan, alt. 7-13,000 ft.,

Royle, Wallich, Griffith, &c.

Stems 12-18 m, loosely tufted, smooth, internodes 5-6, gradually longer upwards, mostly exserted. Leaves  $1\frac{1}{2}-3$  by  $\frac{1}{12}-\frac{1}{10}$  in., rarely broader, narrowly linear, roughish above, glabrous beneath; sheaths appressed, smooth, upper about 4 in.; ligule about  $\frac{1}{12}$  in, ovate or obloug. Panetle up to 6 in, rather flaced, very lax, rathis smooth; lower branches about 2 in, loosely forked at the tips only, branchlets roughish. Spikelets  $\frac{1}{8} - \frac{1}{8}$  in., rather distant, oblong, pale green; gls. thin; I 12-1 in., 1-nerved, keel roughish; II rather larger, 3-nerved, lateral nerves long; fig. gls. 1-7 in., oblong, subobtuse; nerves 5, slender, elongate, sometimes prominent, outer pair & keel or the keel only silky-hairy, wool scanty. Lodicules minute, unequally 2-fid. Anthers about 1 in., linear.

15. P. tremula, Stapf; stem rooting at the base ascending, leaves flat or of the surculi plicate acute flaccid, sheaths of upper largest, ligule oblong, panicle pyramidal, lowest branches solitary or binate, spikelets lax oblong \( \frac{1}{6} - \frac{1}{4} \) in 3-6-fid., gl. I oblong-lanceolate, II acuminate 3-nerved, fig. gls. with upper \( \frac{1}{4} \) hyaline, wool rather copious, keels of palea shortly ciliate. P. altaica, Munro in Herb. Jacquemont (n. 277). P. nepalensis, & nemoralis, Herb. Ind. Or. Hf. & T. (in part). P. trivialis Griseb. in Goett. Nachr. (1868) 75; Duthie Grass. N.W. Ind. 41.—Festuca, Wall. Cat. n.

TEMPERATE & ALPINE HIMALAYA; from Kashmir, alt. 8-15,000 ft., Jacquemont, &c., to Garwhal, Duthie. Western Tibet; Ladak, Thomson, Schlagintweit.

Stems 15-20 in., stoloniferous, erect or ascending from a prostrate rooting base; internodes 5-7, gradually lengthening upwards, all but the upper included in the sheaths Leaves 4-8 by  $\frac{1}{6}$  in., linear, acute, smooth or nearly so, glabrous, flacid, upper often longer than their sheaths; lower sheaths lax, upper about 6 in., smooth; ligule  $\frac{1}{8} - \frac{1}{6}$  in, obtuse, or shorter in the surculi. Pantole up to 10 in., pyramidal, often elongate, very lax and flacid, rachis smooth; lower branches often 6 in., cipillary, flexuous, loosely branched and at the tips only, nearly smooth, branchlets roughish. Spileelets distant, oblong, pale green, rachilla glabrous or hairy; gls. thin, rather distant; I  $\frac{1}{2} - \frac{1}{6}$  in., acute or acuminate, 3-1-nerved, margins hyaline, keel roughish; II rather larger, broader in the middle, lateral nerves sometimes short; flg. gls.  $\frac{1}{6} - \frac{1}{2}$  in., oblong, subobtuse, keel and all the obscure nerves and interspaces or the outer only silky-hairy, palea  $\frac{1}{2}$  shorter, keels ciliate especially towards the base. Lodicules unequally 2-lobed. Anthers  $\frac{1}{20} - \frac{1}{10}$  in, elongate-oblong.

Var. micranthera, Stapf; fl. gls. less hairy, anthers smaller, gls. I and II usually thuner, lateral nerves sometimes obscure.—Kashmir, alt. 12-13,000 ft.,

Clarke, Duthre.

16. **P. Gammieana**, Hook. f.; stem leafy throughout, leaves broadly linear long-acuminate, ligule oblong, panicle contracted or at length open, lower branches binate or solitary, spikelets  $\frac{1}{4} - \frac{1}{3}$  in 3-2-fid., gls. firm, I lanceolate acute, II narrowly oblong, fl. gls oblong tip only hyaline, nerves prominent outer and keel silky-harry, keels of palea shortly ciliate, wool scanty.

SIKKIM HIMALAYA; Tankra Mts., alt. 12,000 ft , Gammie.

Stems 1-2 ft., terete, smooth, leafy; internodes 7-8. Leaves up to 4 by  $\frac{1}{6}$  in, scattered along the whole stem up to the panicle, flat or pheate, glabious, smooth, except the margins and midrib, upper shorter; lower sheaths lax, median  $2\frac{1}{2}-3\frac{1}{2}$  in, asperulous or nearly smooth, except the margins; ligule  $\frac{1}{6}-\frac{1}{4}$  in., acute, dorsally roughly puberulous. Panicle up to  $4\frac{1}{2}$  in , narrow, lower branches capillary, flexuous, loosely branched at the tips only; branches and branchlets smooth. Spikelets  $\frac{1}{4}$  in and upwards, shortly or the terminal longer pedicelled, oblong, acute, pale green; gls. firm, I  $\frac{1}{6}$  in , 3-nerved, margin entire hardly hyaline; II rather longer, narrowly oblong, 3-nerved; fl. gls.  $\frac{1}{6}$  in , acute or subobtuse, keel and outer nerves prominent silky-hairy, palea rather shorter. Lodicules subquadrate, shortly 2-lobed. Anthers  $\frac{1}{6}$  in , oblong.

17. P. annua, Linn. Sp. Pl. 68; stem shortly creeping and rooting stoloniferous, leaves flat flaccid acute, panicle ovate or oblong sometimes subsecund lower branches at length spreading or deflexed, spikelets 3-7-fld., gls. 1 and II oblong-lanceolate obtuse, fig. gls. prominently 5-nerved margins and tip broadly or narrowly scarious, keel and neives below more or less silky ciliate, keels of palea long-ciliate, anthers minute. Host Gram. Austr. ii. t. 64, Fl. Dan. t. 1686; Engl. Bot. t. 1141; Knapp Grom. Britt t. 52; Reichb. Ic. Fl. Germ. t. 82, Ledeb. Fl. Ross. iv. 377; Boiss. rl. Orient. v. 601; Griseb. in Goett. Nachr. (1868) 75; Wight Cat. n. 1789; Thw. Enum. Pl. Zeyl 372; Trim Cat. Ceyl. Pl. 110; Aitchis. Cat Panjab Pl. 168; Duthie Grass N W. Ind. 40, Fodd. Grass. N. Ind. 67 P. alpina, Herb. Strach. & Winterb. n. 12. P. Royleana, Nees ex Steud. Syn. Gram. 256. Herb. Strach. & Winterb. n. 3, Duthie l. c., Griseb. in Goett. Nachr. (1868) 75.

Throughout the TEMPERATE & SUBALPINE HIMALAYA, & WESTERN TIBET, alt. 6-12,000 ft, the Khasia and Nilghiri Hills, alt. 5-7000 ft. (introduced?). Ceylon (introduced?)—Distrib. Europe, Temp. Asia.

Annual or perennial; stolons slender Stems 6-12 in., erect, usually geniculate, slightly compressed, smooth; internodes gradually lengthening upward, upper

exserted or not. Leaves 2-4 in., rarely more, by  $\frac{1}{2}\frac{1}{2}\frac{1}{8}$  in., linear, smooth, margin roughish; sheaths up to 2 in., lax, subcompressed, usually longer than the blade, margins roughish; ligule ovate or oblong, up to  $\frac{1}{3}$  in., shorter in the lower leaves. Penucle up to  $\frac{3}{4}$  in., rigid, lower branches up to  $\frac{1}{2}$  in.,  $\frac{2}{3}$  rarely 3-5-nate or solitary, spreading, naked to the middle and branchlets smooth. Spikelets  $\frac{1}{6}\frac{1}{6}$  in, subsessile or shortly pedicelled, more or less crowded, ovate or oblong-ovate, green or purplish; gl  $\frac{1}{1}\frac{1}{3}\frac{1}{10}$  in., lanceolate, acute, 1-nerved, with sometimes 2-slender lateral nerves, keel muntely scaberulous; II rather longer, 3-nerved; fig. gls.  $\frac{1}{3}$  in, oblong.

obtuse, rarely subacute. Anthers  $\frac{1}{10}$  in Grain  $\frac{1}{25},\frac{1}{13}$  in., oblong.

Var nepalensis, Gliseb. in Goett. Nachr. (1868) 75, perennial, stem 20 in , leaves 12-20 in., ligule shorter, panicle up to 6 in., lower branches almost capillary, upper and branchlets subscaberulous, spikelets more distant longer pedicelled glaucous gieen, keel and outer nerves of fl. gl silky-hairy to the middle, wool often copious — P. annua, β Nees in Herb Royle. Poa nepaleusis, Wall. ex Duthic Grass. N W. Ind. 40.—Poa, Wall. Cat n. 3791 Western Himalaya, from Dalhousie to Nepal.

Var. sikkimensis, Stapf; perennul, 100tstock slender giving off stems surculi and stolons at the nodes, leaves up to i in broad, ligule i in denticulate, panicle 3-6 in, branches slender flexuous and branchlets substaberulous, glumes firmer, flex gls. nearly glabrous, wool 0 P. alpina & nepalensis (in part), Herb. Ind. Or Hi. & T.—Eastern Himalaya, alt. 11-15,000 ft., J D. H., &c., W. Bhotan, Cummins. Some specimens approach P. himalayana in their slender habit and narrower leaves, but the ligule is much larger.

#### UNANOWN SPECIES.

P. HANSIANA, Royle Ill. Bot. Himal. 416 (name).—Hansi & Saharunpore, Royle. Probably, from the localities, P. annua.

#### 119 COLPODIUM, Trin.

See 103. Catabrosa, Beauv. p. 310

## 120. GLYCERIA, Br.

Perennial, rarely annual grasses. Leaves linear, flat or convolute. Spikelets few or many-fid., in contracted or effuse panicles; rachilla jointed between the flg gls. rarely harry, uppermost fl. usually imperfect. Glumes I and II hvaline, empty, persistent, 1-5-nerved; flg. gls broadly oblong obovate or fan-shaped, dorsally rounded, 3-9-nerved, nerves often obscure vanishing below the broadly hyaline obtuse rounded (rarely subacute) or truncate tip; keels of palea smooth or scaberulous. Lodicules 2, minute or well developed. Stamens 3. Styles short. distinct Grain terete or compressed, free or subadherent to the palea—Species about 30 enumerated.

Sect. I. Hydrochloa. Flg. glumes strongly 7-nerved. Lodicules minute.

I. G. tonglensis, Clarke in Journ. Linn Soc. xv. (1876) 119; very slender, leaves narrow smooth, panicle elongate slender, branches few erect at length spreading unequal lower up to 4 in. elect at length deflexed, snikelets \(\frac{1}{2} + \frac{1}{2} \) in. 4-8-fild., gls. I and II 1-nerved. G. caspica, Griseb in Goett. Nachr (1868) 76 (non Trin.) G. fluitans, Duthie Grass. N.W. Ind. 41 (non Br.). G. rivularis, Jacquem. mss.—Poa n. 24, Herb. Ind. Or. Hf. & T.

TEMPERATE HIMALAYA, from Kashmir, alt. 7-9000 ft., and Kumaon, alt. 4-5000 ft., to Sikkim, alt 7-12,000 ft. Munipore, alt 9000 ft., Watt.

Stems widely creeping in wet places, more tufted in drier, 4-18 m., ascending,

slender. Leaves 3-8 by  $\frac{1}{10}$ - $\frac{1}{6}$  in , flat, tips obtuse; sheaths smooth, closed to the mouth; ligule short, rounded or truncate, 2-auricled Panicle very variable, 4-8 in. long; rachis slender, branches few-fld. Spikelets pale-green or purplish, rarely more than 4-fld.; rachilla flexuous, glabrous; gluines glabrous, I and II ovate or ovate-oblong, hyaline, obtuse or subacute, I = about  $\frac{1}{2}$  II; flg. gls. chartaceous, ovate-oblong, tip rounded hyaline, nerves 7 very prominent; palea rigid, incurved, keels strong scaberulous. Inthers very small, linear-oblong. Grain long, slender.—Very near G fluitans, Br., of which it may be a variety, but differs from it in the much smaller and tewer-fld. spikelets Some luxuriant specimens from marshy woods in Sikkim have larger 6-10-fld. spikelets nearly  $\frac{1}{2}$  in. long

## Sect. II ATROPIS. Fl. gls 5-nerved. Lodicules large, hyaline.

2. **G. distans,** Wahlb. Fl. Upsal. 36, leaves linear flat or convolute smooth, panicle erect pyramidal or contracted lower branches up to  $2\frac{1}{2}$  in at length deflexed, spikelets  $\frac{1}{12} - \frac{1}{8}$  in 4-6-fld., gls. I and II very unequal scarious obtuse, flg. gls. broadly ovate-oblong or cuneate tip rounded or retuse and mucronulate crenate. Fl Dan t. 2222, Reichb. Ic. Fl. Germ. t 79, Duthre Grass N.W. Ind. 41. Poa distans, Lunn. Mant. 32; Host Gram. Austr. in t. 63; Fl Dan t. 251, Engl. Bot. t. 986; Knapp Gram. Britt. t. 47. Atiopis distans, Griseb. in Ledeb. Fl. Ross. iv. 388, in Goett. Nachr. (1868) 76; Boiss. Fl. Orient v. 615 Festuca distans, Kunth Revis. Gram. i. 129, Enum Pl. i. 393, Suppl. ii. 303.

WESTERN TIBET, alt 10-16,000 ft., abundant, Thomson, &c.—DISTRIB Europe, N. Asia.

Stems densely tufted with copious fibrous roots, 4-24 in. high, erect or ascending, stout or slender, leafy upwards or at the base only. Leaves very various, flat and \frac{1}{3} in. broad in large specimens, quite smooth, sheaths open for \frac{3}{4} of their length, lower membranous shining; ligule short, scarious. Panicle 3-b in., rachis and branches smooth, lower branches 2-5-nate. Spikelets minute, green, more or less shining, minutely scaberulous; gl. I oblong, 1-nerved; II almost twice as large, usually 1-nerved; flg. gls. very variable, base minutely hairy, margins and tip broadly hyaline, nerves reaching \frac{1}{2}-\frac{3}{2} from the base; keels of palea ciliate. Lodacules oblong, toothed. Anthers \frac{1}{30}-\frac{1}{10} in.

Var. convoluta, Boiss. l. c; stem taller very slender, leaves all convolute, panicle

Var. convoluta, Boiss. I. c; stem taller very slender, leaves all convolute, panicle long narrow, branches shorter erect. G convoluta, Fries Mant. iii. 176. Festuca convoluta, Kunth Revis. Gram. i. 129; Enum Pl. 393. Atropis tenunifora, Griseb. in Ledeb. Fl. Ross. iv. 389, in Goett. Nachr. lc 76—Tibet common, N. Europe and Asia—A different-looking plant from G. distans in its Tibetan form, being much more slender, with narrower more ovate fig. gls.; but very variable, and with

intermediates.

3. **G. Thomsoni,** Stapf, leaves rigid asperulous above smooth beneath, lowest branches of panicle 2-3 in. spikelets up to  $\frac{1}{2}$  in. oblong 3-5-fld., gl. I  $\frac{1}{10}$  in. oblong-lanceolate subacute, II  $\frac{1}{2}$  in. elliptic-oblong obtuse, flg gl  $\frac{1}{6}$  in. tip subacute and margins hyaline yellow. Poa compressa, Griseb in Goett. Nachr. (1868) 75.

WESTERN TIBET, Rupchu above Pugha, alt. 15,500 ft, Thomson.

Tutted, innovations erect. Stem lather stout, compressed, glabrous, sheathed throughout. Leaves up to 6 in., tapering to an acute or subobtuse point, upper shot, pale green, thick, rigid, nerves 7-9 strong; sheaths more or less compressed, not keeled, smooth, striate, loose above, ligule broadly ovate, obtuse, scarious. Panicle ovate-oblong or contracted, erect or inclined; rachis scaberulous or smooth below; branches geminate, filiform, sparingly divided at length spreading, naked to about the middle; lateral pedicels short. Spikelets pale green or variegated; rachilla glabrous; gl. I 1-nerved, margin broadly hyaline; II 3-nerved, tip and margins

hyaline; fig. gls smooth, glabrous, 5-nerved, outer nerves short. Lodicules obliquely ovate, acute. Anthers  $\frac{1}{10}$  in. Ovary obliquely ovoid; styles very short, subterminal. —The long subacute fig. gls. are characteristic.

4. **G. poaeoides,** Stapf; leaves complicate scabr.d above, longest branches of panicle  $1-1\frac{1}{2}$  in., spikelets  $\frac{1}{5-\frac{1}{4}}$  in. 2-4-fid., gl II about  $\frac{1}{10}$  in., fig. gls.  $\frac{1}{5}$  in. obtuse tip broadly hyaline.

Western Tibet; Rupchu, grassy plains at the head of the Salt Lake, Thomson. Stems 1-1\frac{1}{2} ft., tufted, erect; innovation extravaginal erect, their sheaths open to near the base Leaves 2-4 in , linear subacute, rather thick, smooth beneath, ligule triangular ovate acute. Paniole 2-4 in., erect or inclined, rachis scabrid; branches 2-4-nate, filiform, erect, sparingly divided, scaberulous, lowest very unequal, lateral pedicels clavate. Spikelets oblong rather loose, pale green or purplish, rachilla glabrous, disarticulating; gls. thin, finely cihate-serrulate; callus glabrous; I ovoid acute, 3-nerved, ade nerves faint short; II similar with stronger side-nerves; flg gls. broadly elliptic-oblong, quite glabrous, dorsally rounded, nerves obscure except with transmitted light; keels of palea scantily shortly cihate. Lodicules obliquely ovoid. Anthers \( \frac{1}{13} \) in. Ovary pyriform, glabrous

### 121. **FESTUCA**, Linn. (by O. Stapf.)

Perennial, rarely annual grasses. Leaves flat convolute or setaceous. Spikelets 3-many.fld., in open or contracted sometimes spiciform panicles, uppermost fl. imperfect, rachilla jointed below the flg. gls. not produced beyond the uppermost imperfect. Glumes 5 or more; I and II subequal or unequal, empty, persistent, keeled; I 1-very rarely 3-nerved, II 3-very rarely 5-nerved; flg. gls. narrow, acute acuminate or awned, 5-7-nerved, dorsally rounded, or keeled towards the tip only, palea 2-keeled. Lodicules 2. Stamens 3. Ovary glabious or crown more or less hairy, not or slightly enlarged; styles terminal, rarely subterminal, stigmas plumose. Grain ventrally concave or grooved rarely flat, glabrous or crown hairy, free or more or less adherent with the palea, rarely with the gl., hilar area elongate.—Species many, chiefly of temp. climates.

The species are for the most part extremely difficult of discrimination.

- Sect. I. EU-FESTUCA. Perennial Empty gls. subequal. Stamens 3.
- A. Vernation of all the leaves conduplicate permanently, or cauline more or less flat, always very narrow.
- \* Flg. gls. strongly involute, tightly embracing the grain firm, scabrid or if smooth not shining; ovary glabrous, innovations always intravaginal, their leaf-sheaths usually open to or near to the base, or middle in F. Cumminsit.
- 1 F. valesiaca, Schleich. ex Gaud. Agrost Helvet i. 242; slender, rigid, erect, leaves 2-6 in., panicle 1-2 in narrow usually stiff, branches very short, spikelets \(\frac{1}{2}\)-\(\frac{1}{2}\) in. 3-4-fld., awn much shorter than its gl., anthers linear \(\frac{1}{30}\)-\(\frac{1}{4}\) in., grain adherent to palea and often to the gl. Kunth Enum Pl. i 401, Suppl. 334; Reichb. Ir. Fl. Germ. t. 63, Steud Syn. Gram. 306. F. duriuscula, & parviflora, Hack. in Herb. Duthie, & var. tenus, Hack Monogr. Fest. Europ. 288. F. ovina, L., var. Pseudovina, Hack. l c. F. ovina, Host Gram. Austr ii. 62, t. 86 (non Linn.). F. stricta, Herb Royle. F. dubia & F. filitormis, Jacquem. mss.—F. n. sp. Herb. Strach. & Winterb. n. 2.

TEMPERATE and ALPINE HIMALAYA, alt. 10-16,000 ft., from Kashmir to Sikkim.

-DISTRIB Central and Eastn. Europe, Orient, Central Asia, Rocky Mts.

Stems 4-14 in. tufted, nodes 2, both in the lower 1 of the stem. Leaves 2-6 in., setiform to capillary, 3-5-nerved, green or glaucous, rarely rough, bands of sclerenchyma distinct; sheaths of innovs. tight, smooth, open to near the base, persistent when dry; ligule very short, obscurely auricled. Panicle contracted; branches erect, solitary or 2-nate; lateral pedicels shorter than the spikelets. Spikelets oblong, broadly obovate when open, pule green or purplish; gl. I 1 sin. lanceolate, acute or subacute; II similar 1 in.; flg. gls. 1 - 6 in., smooth to scaberulous, pruinose, 5-nerved; palea oblong-lanceolate, sub-2-toothed, keels scabiid. Lodicules minute, obliquely ovoid. Anthers 1 or 1 in., ventrally grooved, hilum almost as long as itself.—As represented in India I. valenaca is a very well defined species.

Var. tibetica, Stapf; stem 2-6 m., sheaths entire below the middle, panicle  $\frac{1}{2}$ -1 in. long up to  $\frac{1}{3}$  in broad, fig. gls  $\frac{1}{6}$  m, more or less purplish black and scabbid in the upper  $\frac{1}{3}$ , awn minute, anthers  $\frac{1}{30}$   $\frac{1}{30}$  in. Fovina, var. alpina, Griseb. in Goett. Nachr. (1868) 73. Tibet N. of Sikkim, alt 17-19,000 ft. Differs from F. ovina, var Halleri, to which it is referred by Hack. l. c. 112, in the sheaths being

open to the middle and in the very minute anthers.

2. **F. Cumminsii**, Stapf; stem slender, leaves  $\frac{3}{4}$ 4 in., sheath open to below the middle, panicle 2-4 in. narrow nodding or flexuous, branches distant erect and flexuous, spikelets  $\frac{1}{4}$ - $\frac{1}{3}$  in. elliptic or (open) obovate awned, rachilla scabrid, flg. gls. oblong-lanceolate, palea 2-fid, anthers elliptic  $\frac{1}{30}$ - $\frac{1}{25}$  in., grain free. F. duriuscula,  $Herb\ Ind.\ Or.\ Hf.\ & T.\ (in\ part).$ 

SIRKIM HIMALAYA, alt. 11-12,000 ft., J. D. H. W. BHOTAN, Cummins.

Stems 1-1½ ft., tufted, nodes 2-3 uppermost towards the middle, smooth except (usually) below the panicle. Leaves setaceous, or cauline rarely flat, very narrow ( $\frac{1}{2}$ 0 in.), subacute, smooth, nerves 5 green strong above, obscure beneath, marginal and carmal bands of sclerenchyma very slender; sheaths of innovs open far beyond the middle, smooth, subpersistent, of the cauline leaves tight; ligule short, auricles usually long and acute. Pancele with scabrid rachis; branches usually solitary, dividing from near the base, scabrid; lateral pedicels shorter than the spikelets or very short. Spikelets pale green or puiple, more or less scaberulous; I  $\frac{1}{10}$ - $\frac{1}{7}$  in., 1-nerved; II lanceolate, acute,  $\frac{1}{7}$ - $\frac{1}{7}$  in., 3-nerved; flg. gls.  $\frac{1}{3}$ - $\frac{1}{4}$  in., awn half as long to as long as the gl.; palea as long as the gl., conspicuously 2-fid, more or less scabrid. Lodscules 2-lobed. Ovary glabrous. Grain linear-oblong,  $\frac{1}{7}$ - $\frac{1}{8}$  in., ventrally grooved, hilum slightly exceeding the middle

3 **F. polycolea**, Stapf; densely tufted, leaves setaceous, sheaths of innovs. crowded open to the base, panicle 2-3 in. open or contracted rigidly erect, rachis scabrid rarely nodding, branches subsolitary, spikelets  $\frac{1}{2}$ - $\frac{1}{3}$  in., glumes scabrid, fig. gls. oblong-lanceolate awned, palea 2-fid, anthers linear  $\frac{1}{17}$ - $\frac{1}{14}$  in., grain free. F. duriuscula, Herb. Ind. Or. Hf. & T. (in part).

NEPAL, Wallich. SIKKIM, alt. 12-16,000 ft., J. D. H., &c.

Stems \(\frac{3}{4}\)-1\frac{1}{4}\) ft., nodes 2 in the lower half or third, smooth or scabrid below the panicle. Leaves rather rigid, of the innovations up to 6-8 in., subacute, smooth, not or obscurely sulcate, 5-nerved, bands of sclerenchyma continuous beneath or nearrly so; sheaths persistent, pale, shining, of the stem tight smooth; ligule very short, obtusely auricled. Panicle ovate or narrower; lower branches scabrid, sometimes 2-nate, \(\frac{1}{2}\)-rarely 1\(\frac{1}{4}\) in., very sparingly divided from near the base, upper with 1-2 spikelets; lateral pedicels shorter than the spikelets. Spikelets greenish; glumes firmly membranous; I \(\frac{1}{6}\) in., subulate-lanceolate, 1-nerved; II \(\frac{2}{3}\)-\frac{2}{6}\) in.

lanceolate, acute; fig. gls.  $\frac{1}{3} - \frac{2}{6}$  in., strongly involute, nerves 5 faint, awn from  $\frac{1}{2}$  to as long as the gl.; palea as long as the gl., scabrid or puberulous. Lodicules 2-lobed. Orazy glabrous. Grain  $\frac{1}{10}$  in., linear-oblong, deeply grooved, hilum slightly exceeding the middle.

Var. brevis, Stapf, stems 4-6 in. often shorter than the leaves, sheaths open to the middle only, panicle  $\frac{1}{2}$ - $\frac{1}{2}$  in. contracted, fig. gls.  $\frac{1}{7}$  in., anthers  $\frac{1}{2}$ - $\frac{1}{17}$  in.—Sikkim Himalaya, alt. 11-13,000 ft.—Referred by Hackel (Monogr. Festuc. Eur. 89) to F. ovina, var. supina, but evidently only a dwarfed state of F polycolea.

- \*\* Fig. gls. glabrous or nearly so except sometimes towards the tip, thin, more or less shining; ovary very rarely glabrous—Innovations intravaginal, their sheaths closed to beyond the middle, except in nitidula.
- † Flg. gls.  $\frac{1}{5}$  in., anthers minute, paniele usually very flexuous and flaccid.
- 4. **F. nitidula**, Stapf; stems tufted, node solitary near the base, leaves 1-2 in. very narrow, panicle  $1\frac{1}{2}$ -3 in., ovate open or contracted, branches usually spreading flexuous naked to beyond the middle, spikelets  $\frac{1}{2}$ - $\frac{1}{4}$  in. 2-5-fld., margius of gls. narrowly hyaline, flg. gls.  $\frac{1}{7}$  in. oblonglanceolate, awn half as long as the gl, anthers elliptic  $\frac{1}{50}$ - $\frac{1}{10}$  in., ovary top sparsely hispidulous. F. pumila,  $Duthie\ Grass.\ N.W.\ Ind.\ 42\ (non\ Vill\ )$ ;  $Herb.\ Strach.\ &\ Winterb.$ —Festuca, n. 10,  $Herb.\ Ind.\ Or.\ H.f.\ &\ T.$

WESTERN TIBET; Nubra, alt. 12-14,000 ft, Thomson. N. of Kumaon, alt. 15,000 ft, Strackey & Winterbottom

- Stems  $\frac{1}{2}-1\frac{1}{4}$  ft., far exserted beyond the uppermost sheath, smooth. Leaves complicate, rather thick, green, 5-7-nerved, smooth, bands of sclerenchyma hardly any; sheaths of innovs closed to about  $\frac{1}{3}$ , smooth; lignle very short, ciliolate, more or less auricled. Panicle flexuous, sometimes flaccid; rachis smooth below; branches up to  $\frac{1}{2}$  m., solitary or lowest 2-nate, subcapillary, spuringly divided; lateral pedicels often very short Spikelets elliptic to lanceolate, green or purplish; gls. thinly membranous, I  $\frac{1}{17}-\frac{1}{10}$  m., lanceolate; II  $\frac{1}{8}$  m., lanceolate, distinctly 3-nerved; fig. gls. smooth, very minutely scaberulous below the tip; awn  $\frac{1}{3}$  as long as the gl.; palea about as long as the gl., keels scaberulous. Lodicules 2-lobed. Grain  $\frac{1}{10}$  m., free or adherent to the base of the palea, linear-oblong, hilum  $\frac{1}{3}$  of the grain Thomson's specimens are tall and very slender, Strachey & Winterbottom's only 3-5 in. high.
- 5. **F. undata**, Stapf; stems tufted erect or base geniculate sheathed beyond the middle or almost to the panicle, nodes 2-3, uppermost about median, leaves subsetaceous subacute complicate or the cauline flat tapering to a fine point, panicle 4-6 in. flaccid flexuous, branches few subcapillary flexuous, spikelets  $\frac{1}{4-3}$  in. 2-4-fld lanceolate, gls. thinly membranous, flg gls. oblong-lanceolate, awn 0 or very short, anthers not  $\frac{1}{2}s$  in. top of ovary hispidulous rarely glabrous—Bromus, No. 16, Herb. Ind. Or. H. f. F.

SIKKIM HIMALAYA, alt. 12,000 ft , J. D. H

Stems 1-2 ft. Leaves glabrous or puberulous above, 7-9-nerved, green; sheatlis tight, basal thin brown rarely finely harry; ligule very short, truncate, scarcely auricled, glabrous or sparsely ciholate. Panicle often more or less secund; rachis smooth or scabrid, very slender; branches simple or very sparingly divided, solitary or the lowest binate up to 3 in. Spikelets pale green, somewhat shining, rachilla scantily scabrid, internodes very short; gl. I 1 in., lanceolate, 1-nerved; II in., broadly lanceolate, acuminate, 3-nerved; palea oblong-lanceolate, about equal the gl, obscurely 2-toothed. Lodicules obliquely ovoid, sub-2-lobed. Anthers violet. Styles terminal.

Var. aristata, Stapf; awn as long as the gl. or rather longer very slender, anthers  $\frac{11}{20} - \frac{13}{20}$  in , ovary (very young) glabrous.—Bromus?, No. 15, Herb. Ind. Or. Hf. & T.—Sikkim, alt. 11,000 it.

- †† Flg. gls.  $\frac{1}{5}$ - $\frac{3}{10}$  in.; anthers linear,  $\frac{1}{12}$ - $\frac{1}{6}$  in.; panicle less wavy or flaccid.
- 6. **F. kashmiriana**, Stapf stems tufted, nodes 1-2 rarely 3 uppermost below the middle, leaves of the minovs, hexagonal, panicle 2-5 im, branches solitary lowest rarely geminate, spikelets  $\frac{1}{3} \frac{2}{3}$  in. elliptic-oblong 3-5-fid., gls. thinly membranous, fig. gls. oblong-lanceolate  $\frac{1}{3} \frac{1}{4}$  in., awn  $= \frac{1}{2}$  gl. or longer, top of ovary densely hispid, grain loosely adherent to the palea. F. duriuscula, Duthie Grass. N.W. Ind. 41; Herb. Royle & Hook. f. & T. in part.

TEMPREATE and ALPINE HIMALAYA; from Kashmir to Kumaon, alt. 8-14,000 ft.

Stem 1-2 ft., unnovations always apo-geotropic; sheaths of (always?) intravaginal shoots, tight, smooth, closed to the middle or 3, rarely higher. Leaves (cauline) setaceous, usually shorter than of the unovations, rarely flat, more or less puberulous above, smooth beneath, green, sulcate between the 5-7 nerves, bands of sclerenchyma distinct; ligule short, truncate, ciholate, scarcely auricled. Panicle usually contracted, rather stiff or flexuous, rachis scaberulous or smooth below; branches erect or spreading, filiform, scaberulous, sparingly divided from below the middle; lateral pedicels = 1 the spikelet or shorter. Spikelets green or tinged with purple or violet; gls. smooth or obscurely scaberulous; internodes of rachilla  $\frac{1}{20}$  in., minutely scaberulous; gl. I  $\frac{1}{12}$   $\frac{1}{10}$  in , lanceolate, 1-nerved , II  $\frac{1}{7}$  in., lanceolate or ovate-lanceolate, acute, 3-nerved; fig gls. faintly 5-nerved. Lodicules obliquely oblong, 2-lobed. Anthers 12 in , linear. Grain k in , linear-oblong, grooved. hilum nearly as long as the grain.-I have seen only one specimen amongst all the forms of F. Lashmiriana with apparently (but by no means typical) extravaginal innovatious. Variegated specimens of the type resemble var. nigricans (F. nigricans, schleich.) of F. violacea, and F. rubra var. fallax, forma alpestris (F. nigrescens, Lam ) from which they differ in absence of extravaginal shoots, more open sheaths, and more hispid ovary with a slightly developed constriction below the top.

Var. ligulata, Stapf; more flaccid, leaves up to 1 ft., ligule up to  $\frac{1}{13}$  in. with more or less acute auricles. F. violacea, var. virescens, and F. rubra genuna, Hack.

mss.—Kashmir, alt. 11-13,000 ft., Duthre.

Var. debilis, Stapf; very flaccid, cauline leaves up to 8 by  $\frac{1}{10}$  in. pubescent above, nerves very prominent beneath, panicle flaccid, spikelets green, awn long or short. F. heterophylla, Lamk. ex Hack. mss.; Griseb. in Goett. Nacht. (1868) 73—Kashmir, alt. 8-12,000 ft., Duthie.—Approaches closely shade forms of F. hetero-

phylla, differing only in the structure of the leaves.

Var. simlensis, Stapf; taller, more robust, cauline leaves up to 1 ft. by  $\frac{1}{10}$  in. almost flat, ligule short, panicle 6–12 in., spikelets  $\frac{1}{3} - \frac{1}{4}$  in., internodes of rachilla up to  $\frac{1}{8}$  in., gl. I  $\frac{1}{7} - \frac{1}{6}$  in., flg. gls up to  $\frac{1}{8}$  in., awn = the gl. or rather shorter. F. duriuscula, Herb. H. f. & T. (in part) ? F. ovina, Grissb. in Goett. Nachr. (1868) 73.—Simla, alt. 7–8000 ft., Thomson, Duthie — Habit rather of F duriuscula, differing in the more closed sheaths and harry tip of ovary Distinguished from certain forms of F. rubra, L., by the harry ovary and absence of stolons.

7. F. altaica, Trin. ex Ledeb. Fl. Alt. i. 109, Fl. Ross. iv. 354, Ic. t. 228; stems tufted, nodes 1-2, leaves up to 9 in. subsetaceous, sheaths crowded open to the middle latterly to the base, ligule very short, panicle 4-6 in. very loose, lower branches 2-nate long slender with 1-2 subterminal spikelets, lateral pedicels equal to or longer than the 3-fid. variegated spikelets which are  $\frac{1}{3}$  in. long, glumes thin tips and margins hyalne,

fig. gls.  $\frac{1}{4} - \frac{3}{10}$  in., awns shorter or gl. mucronate, ovary pyriform tip hispidulous. Kunth Enum Pl. i. 411; Stend. Syn. Gram. 315. F. Duthiei, Hack wass.

Western Tibet; Dras, alt. 11-12,000 ft., Duthie; Karakoram, alt. 14,500 ft., Clarke.—Distrib. Central Asia, Siberia.

Stems 1]-2½ ft., smooth. Leares subrigid, complicate, smooth, margin obscurely scabrid, nerves 7-9 slightly prominent, bands of sclerenchyma distinct, cauline sometimes flat, short; sheaths of innovs. open to the middle, soon splitting to the base ligule very short. Panicle ovate, rachis slender smooth, branches up to 3 in. subcapillary flexuous. Spikelets oblong, internodes  $\frac{1}{2^{10}}$  in , scaberulous; gl. I  $\frac{1}{7}$  inlanceolate, acute, 1-nerved, II  $\frac{1}{10}$  - $\frac{1}{10}$  in., distinctly 3-nerved; flg. gls. oblong-lanceolate, smooth or subscaberulous towards the acute tip, nerves 5 faint; palea = the gl., linear-oblong, keels minutely scaberulous. Lodicules obliquely ovate. Anthers  $\frac{1}{7}$ - $\frac{1}{10}$  in , linear. Styles terminal —Very near the American F. scabrella, Tori. Trinuis describes the rhizome as stoloniferous, but I find no trace of stolons.

- \*\*\* Fig. gls. glabrous or pubescent; top of ovary glabrous, rarely minutely hairy. Innovations intra- and extravaginal, their leaf-sheaths closed almost to the mouth, the extravaginal often stoloniferous.
- 8. **F. Levingei**, Stapf; stems smooth, nodes 2, upper in  $\frac{1}{2}$  of stem, cauline leaves up to 4 in. very narrow, sheaths of innovs. open to middle, glabrous or minutely puberulous above, ligule very short obscurely auricled, panicle 2-3 in. linear strict, branches usually binate erect, lower naked for  $\frac{1}{2}$ , spikelets  $\frac{1}{3} \frac{1}{4}$  in. 4-5-fid. compact, internodes of rachilla very short minutely scaberulous, fig. gls.  $\frac{1}{3} \frac{3}{10}$  in. oblong acute awnless or mucronate, anthers oblong, ovary glabrous or nearly so.

KASHMIR. Levinge.

- Stems 1½ ft, extravaginal innovations present very slender, their leaves finely setiform, flaced, green, 5-nerved, bands of selerenchyma fine. Pancele striate, branches often appressed to the rachis, lowermost up to 1½ in.; lateral pedicels short, thick. Spikelets green; rachilla munutely scaberulous; gls. membranous, glabrous or minutely puberulous or scaberulous; I ½ in., lanceolate, acute; II broadly oblong-lanceolate, acute or subobtuse; palea linear-oblong, almost = gls., keels ciliolate. Loducules oblong, sub-2-lobed. Anthers ½ ½ in. Grain ½ in. loosely adherent to the palea, linear-oblong, grooved, hilum almost = the grain.
- 9. F. rubra, Linn. Sp Pl. 74; stems smooth, nodes 2, extravaginal innovations frequent ascending or stoloniferous, leaves subsetaceous, ligule very short truncate exauncled, panicle 3-5 in., rachis scabrid, branches solitary or lowest binate divided from or near the base, spikelets  $\frac{2}{3}-\frac{2}{3}$  in. oblong loose 4-9-fid., fig. gls. strongly involute oblong-lanceolate margin above broadly hyaline awned, anthers linear, ovary glabrous. Host Gram Austr. ii. 59, t 82; Engl. Bot t 2056; Kunth Enum. Pl. i. 401, Suppl. 331, Steud Syn Gram 308, Ledeb. Fl. Ross. iv. 352; Boiss. Fl Orient v. 62; Duthie Grass. N.W. Ind. 42 (in part); ? Griseb. in Goett. Nachr. (1868) 74.

TEMP. and SUBALPINE HIMALAYA, alt. 6-13,500 ft. KHASIA HILLS, alt. 5-6000 ft (var. Clarkei).—DISTRIB. Temp. and Arctic Europe and Asia.

Stems 1½-2½ ft., erect or geniculate below, striate. Leaves 3-5 in., all subsetaceous or cauline linear flat, rather thick, green, 3-7-nerved, subacute or almost obtuse, smooth; sheaths of innovs. tight, smooth, closed almost to the mouth. Panicle very variable, narrow, nodding and secund or erect, rather dense and ovate, longest branches 2 in.; pedicels short. Spikelets green or variegated, glabrous or hairy and ciliate; rachilla scabrid, internodes ½ in.; gl. I ½ in., lanceolate, acuminate, nerve

percurrent or subexcurrent; II  $\frac{2}{9}$  in., ovate-lanceolate; fig. gls. up to  $\frac{1}{7}-\frac{2}{9}$  in., nerves 5, faint; awn slender, up to  $\frac{1}{10}$  in , palea = the gls, linear oblong, shortly 2-fid, keels ciliolate. Lodscules obliquely ovate, sub-2-lobed. Anthers 12-18 in. Ovary with rarely 1-2 minute hairs. Grain 1 in , linear-oblong, grooved, sometimes adherent to both gl. and palea, hilum nearly equal the grain.—It is impossible to separate the hairy glumed from the glabrous forms; these vary in specimens from different localities, and Clarke has found them growing in the same spot in the Karakoram Mts. To make a comparative analysis of the Indian forms with the European and Oriental would involve a most minute examination of all the latter and lead to the creation of a number of new varieties and subvarieties with ephemeral characters. Most of the Indian specimens fall into Hackel's subsp. eur. rubra var. genuina, and var. fallax (Monogr. Festuc. Europ. 138, 142). The glabrous stoloniferous specimens answer more or less to his subvar. vulgaris; those with short erect or ascending innovations to var. fallax and mostly to forma alpestris, which has thicker leaves and highly variegated spikelets; the pubescent to his subvar. E. barbata. The principal synonyms cited by Hackel for these forms are -F. alpestris, Wulf. Fl. Nor. Phan. Ed. Fenzl, & Graf, 151. F. barbata, Schrank Prim. Fl. Salisb. 46. F. heterophylla, Hænke in Jacq. Collect. ii. 93. F. hirsuta, Fl. Dan. t. 1627? (non Host). F. Kitaibeliana, Schult. Mant. ii. 398 (for var. genuina). F. longifolia, Hegetsch. & Heer Fl. Schw. 91. F. nigrescens, Lam. Encycl. ii. 460. F pubescens, Willd. Enúm. Pl 6. F. repens, Hegelsch. & Heer l. c. 92. F. rubra, var. bankalensis, Griseb. in Goett. Nachr. (1868) 74, is probably this. The true F. baikalensis is not found in India.

Var. Clarkei, Stapf; extravaginal innovations very rare slender, leaves subsetaceous cauline rarely flat, panicle 3-5 in nodding, branches few subsecund lowest up to 3 in. rigid or flexuous mostly obliquely erect, spikelets ½ in pale green, gl. I ½ in., II ½ in., flg. gls. ½-75 in., awn = ½ to nearly all gl., anthers ½-½ in., grain ½ in.—Kangra and Dalhousie, alt. 7-8000 ft., Clarke. Khasia Hills, alt. 4-6000 ft.,

Clarke (a form with setaceous leaves and very long anthers).

B. Venation of leaves convolute, at length flat or subconvolute  $\frac{1}{10} - \frac{7}{10}$  inbroad.

- \* Flowers hermaphrodite; innovations (when known) extravaginal.
- † Flg. gls. awned, awn as long as the gl. or longer, very slender.

10. F. gigantea, Vill. Hist. Pl. Dauph. ii. 110; leaves amplexicaul, panicle 4-16 in., branches rather distant undivided to the middle, spikelets about  $\frac{1}{2}$  in., flg. gls.  $\frac{3}{10} - \frac{1}{3}$  in., awn twice as long, anthers linear. Kunth Enum. Pl. i. 407, Suppl. 339; Reichb. Ic. Fl. Germ. t. 358; Engl. Bot. t. 1820; Ledeb. Fl. Ross. iv. 354, Boiss. Fl. Orient. v. 621; Duthie Grass. N.W. Ind. 41; Griseb. in Goett. Nachr. (1868) 74 (in part). F. aristata, C. Koch in Linnæa, xxi. (1848) 412. F. triflora, Sm. Engl. Bot. t. 1918; Desf. Fl. Atlant. 6, t. 20. Bromus giganteus, Linn. Sp. Pl. 77; Fl. Dan t. 1630; Reichb. l. c. t. 76; Knapp Gram. Britt. t. 87; Host Gram. Austr. 87, t. 6. B. triflorus, Linn. Sp. Pl. Ed. ii. 115, Fl. Dan t. 440.

TEMP. HIMALAYA; from Kashmir to Kumaon, alt. 5-9500 ft.—Disteib. Europe, N. Asia.

Rootstock very short, roots fibrous. Stems loosely tufted, 2-4 ft., smooth, nodes 3-5. Leaves 5-12 by  $\frac{1}{3}-\frac{1}{2}$  in., linear to linear-lanceolate, finely acuminate, flat, flaccid, dark green, loosely many-nerved, smooth, margins minutely scaberulous; sheaths of innovs. terete, open to the base, smooth or asperulous below the mouth; ligule very short, truncate, glabrous. Panicle ovate or oblong-ovate, nodding, branches solitary or the lowermost binate, spreading, flexuous, scabrid; branchlets few-fid. spreading or appressed, pedicels short or the lower sometimes = the spikelet. Spikelets linear-lanceolate, pale green, rachilla scabrid; gls. membranous, I  $\frac{1}{10}$  in., Vol. VII.

subulate-lanceolate, 1- or obscurely 3-nerved at the base, margin white-hyaline; II \( \frac{1}{2} \) in , lanceolate; fig. gls.  $\frac{2}{10} - \frac{1}{3}$  in , oblong-lanceolate, acute or tip obscurely 2-fid, margins narrowly hyaline, minutely pubernlous below the tip, nerves faint; awn subterminal, straight or flexuous, palea oblong-lanceolate, 2-toothed, keels minutely scabernlous. Lodicules large, 2-3-fid. Anthers  $\frac{1}{10} - \frac{1}{7}$  in. Ovary quite glabrous. Grain \( \frac{1}{2} \) in , linear-oblong, tightly adherent to the palea and usually the gl., groove flat; hilum nearly = the grain.

11. **F. leptopogon,** Stapf; leaf-base obtuse or rounded, panicle 6-12 in., branches distant dividing from near the base, spikelets  $\frac{1}{4}$  in. or rather more, fig. gls  $\frac{1}{4}$ - $\frac{1}{3}$  in, tip 2-fid, awn in the sinus = the gl. or rather longer. F. gigantes, Griseb. in Goett. Nachr. (1868) 74 (in part). Bromus, No. 17 & 18, Herb. Ind. Or. II f. & T.

SIKKIN HIMALAYA, alt. 8-11,000 ft., J. D. H. KHASIA HILLS, alt. 5-6000 ft., Hool f. & T., Clarke.

Rootstock short, slender, roots fibrous. Stems 2-4 ft., loosely tufted, nodes 5-6. Leaves, sheaths and ligule as in F gagantea, but blade smaller, 4-7 by  $\frac{1}{12}$  in., and base not amplexical. Panucle open or contracted, erect or nodding, branches scabrid; branchlets few, distant, more or less appressed, lateral pedicels very short. Spilelets linear-lanceolate, pale green; rachilla scabrid, intendeds short; gls. membranous, I  $\frac{1}{12}$  in., subulate-lanceolate, margins white-hyaline; II  $\frac{1}{8}$  in , lanceolate; fig. gls. scaberulous below the tip, margins narrowly hyaline, nerves faint; palea linear-lanceolate, finely pointed, keels minutely scaberulous. Lodicules 2-fid. Anthers  $\frac{1}{2}$ ,  $\frac{1}{20}$  in., elliptic. Otary with the top minutely hispidulous. Grain  $\frac{1}{7}$  in., linear-oblong, free or adherent to the base of the palea, groove very shallow, top hispid, hilum =  $\frac{2}{3}$  of the grain.

- †† Flg. gls awnless, mucronate.
- 12. **F.** asthenica, Hook. f.; stems rather slender, nodes 3, leaves linear narrowed at the base, panicle 5-8 in., branches capillary rough sparingly divided beyond the middle, pedicels capillary, spikelets  $\frac{3}{10} \frac{1}{3}$  in. lanceolate 2-4-fld., internodes of rachilla short, fig. gls. ovate-lanceolate acute 3-5-nerved.

KASHMIR, alt. 7-9000 ft., Clarke, Duthie.

- Stem tall, up to 4 ft., smooth, innovations unknown. Leaves 6-11 by  $\frac{1}{12}$  in. Innear, finely acuminate, flaccid, rough, pale green, many-nerved, flat, young convolute; sheaths smooth or the lower scabrid, striate; ligule  $\frac{1}{10}$  in, scarious, very obtuse, ciliolate, at length lacerate. Panicle more or less contracted, nodding, flexuous; rachis smooth below; lowermost branches up to 3 in., binate. Spikelets obovate when open, green; rachilla minutely scaberulous, internodes  $\frac{1}{10}$  in; gls. thinly membranous; I  $\frac{1}{3}$  in, subulate-lanceolate, 1-nerved, hyahne except along the percurrent nerve; II  $\frac{1}{3}$  in, oblong-lanceolate, acute, 3-nerved; flg. gls.  $\frac{1}{3}$  in, ovate-lanceolate, acute, 5-nerved (2 lateral nerves very faint), scaberulous, tip hyaline; palea linear-oblong, minutely 2-toothed, keels slightly scabrid. Lodicules obliquely ovate. Anthers  $\frac{1}{10}$  in, linear. Ovary hispidulous on the top. Grain  $\frac{1}{2}$  in, invarianceolong, dorsally flat and almost so ventrally, slightly adherent to the palea, hilum  $\frac{1}{4}$  in. shorter than the grain.
- 13. F. modesta, Steud. Syn. Gram. 316; stem tall rather stout, nodes 2-3, leaves of innovations linear finely acuminate, cauline smaller, panicle 6-12 in. loose open, rachis scabrid, lower branches very long binate sparingly divided beyond the middle, lateral pedicels short, spikelets about ½ in. loosely 3-4-fld., internodes of rachilla long, flg. gls. oblong acute 5-7-nerved. Duthie Grass. N. W. Ind. 42. F. elatior, Herb. Strackey & Winterb. n. 3. Schedonorus modestus, Nees ex Steud. l. c.

WESTERN TEMPERATE HIMALAYA, from Jamu to Kumaon, alt. 7-8700 ft.,

Roule, &c

Stems 4-5 ft., losely tufted; innovations ascending or stoloniform. Leaves of innovs. up to 2 ft. by  $\frac{1}{2}-\frac{3}{2}$  in., flat, young convolute, rough or almost smooth, subrigid, many-neived, cauline 4-6 by  $\frac{1}{3}-\frac{7}{10}$  in.; sheaths open to the base, smooth or the lower rough, strongly striate, at length brown; ligule  $\frac{1}{2}$  in., truncate, chlolate, at length lacerate. Pancele ovate, lower branches up to 8 in. Spikelets green, open obovate; rachilla scabrid, internodes up to  $\frac{1}{10}$  in.; gls. thinly membranous, I  $\frac{1}{2}$  in., subulate-lanceolate, hyaline except along the percurrent nerve; II  $\frac{1}{2}$  in., oblong-lanceolate, acute, 3-nerved, fig. gls  $\frac{7}{10}-\frac{1}{3}$  in., scaberulous, margins narrowly hyaline; palea linear-oblong, 2-dentate, keels scarcely scabrid. Lodicules broadly elliptic, very obtuse. Anthers  $\frac{1}{10}$  in., linear. Ovary top hispid, styles terminal.

14. **F. lucida**, Stapf; stem tall, nodes 2, leaves linear glaucous, sheaths long loose white, panicle 6-7 in. broadly ovate, branchlets very scabiid, lateral pedicels long, spikelets  $\frac{s}{t} - \frac{\rho}{10}$  in. glistening, fig. gls. oblong acute or subobtuse mucronate t-7-nerved, tips and margins hyaline, white.

WEST HIMALAYA, GARWHAL, Jaunsar, in the Deodar forest, alt. 9000 ft, Duthe.

Stem 2-3 ft., rather stout, smooth; internodes 2, elongate. Leaves 6-12 by  $\frac{1}{2}-\frac{1}{4}$  in., finely acuminate, flat except the involute scaberulous margins, firm, smooth, glaucous, many-nerved; basal sheaths of innovs. very long, cauline tighter pale glaucous; ligule  $\frac{2}{3}-\frac{1}{3}$  in., white, split to the middle into fine fibres. Panicle very lax; branches simple to beyond the middle, rough, lowest 4 in; lateral pedicels  $\frac{1}{3}-\frac{1}{2}$  in. Spikelets pale green; rachilla scabrid, internodes  $\frac{1}{10}-\frac{1}{5}$  in , gl.  $\frac{1}{3}$  in., ovate, acute or subacute, shortly 1-nerved, hyaline except at the base; II similar,  $\frac{2}{5}-\frac{1}{5}$  in, midrib percurrent, 2 side-nerves very short; fig. gls  $\frac{1}{3}-\frac{3}{5}$  in membranous, pale green, scaberulous, side-nerves prominent; palea linear-oblong, obscurely 2-fid, keels scabrid. Lodicules obliquely ovoid. Anthers  $\frac{1}{5}$  in., linear. Ocary with a slightly oblique hispidulous top, styles just below the top.

\*\* Flowers diœcious; innovations intravaginal.

15. **F. sibirica**, Hack. ex Boiss. Fl. Orient. v. 626; stem sheathed to the top, leaves linear firm, panicle 3-6 in. ovoid or linear, lower branches simple or divided beyond the middle with 1-4 ovate-oblong 4-6-fid. spikelets, flg. gls.  $\frac{1}{6}$  in. ovate or ovate-oblong subobtuse scaberulous, margins subciliolate or denticulate, awnless or tip setiform. F. mutica, Jacquem. mss. Schedonorus transparens, Munro mss. Poa albida, Turcz. ex Trin. in Mem. Acad. Petersb. Ser. VI. i. (1831) 387; Kunth Enum. Pl. i. 387. P. pallida, Jacquem. mss. Leucopoa sibirica, Griseb. in Ledeb. Fl. Ross. iv. 383, in Goett. Nachr. (1868) 76.—Festuca, n. 3, Herb. H.f. & T.—Schedonorus, n. 2, Herb. Strachey & Winterb.

WESTERN TIBET, alt. 13-15,000 ft., from Ladak to N. of Kumaon.—DISTRIB.

Caucasus, Altai Mts., Dahuria.

Stems 1-2 ft., tufted, erect, smooth. Leaves 6-10 in., rarely more, by  $\frac{1}{10}-\frac{1}{7}$  in., linear, finely acuminate, smooth or scabrid, subconvolute, dull green, nerves many very prominent, lower cauline one 3 in.; sheaths of innovs open to the base, terete, lasal crowded, cauline smooth; ligule very short, membranous, truncate, chate. Panule very narrow or expanded, stiff or flexuous; lower branches solitary or binate, erect or spreading, very variable in length; lateral pedicels very short. Spikelets pale green,  $\frac{1}{10}-\frac{1}{10}$  in., very broad when open; rachilla minutely scabrid, internodes  $\frac{1}{40}$  in.; gis. thin, I  $\frac{1}{10}-\frac{1}{7}$  in , ovate to ovate-lanceolate, subacute, 1-nerved or 3-nerved at the very base, white and hyaline except along the green nerve; II about  $\frac{1}{3}$  in., similar, but more oblong and usually distinctly 3-nerved; fig. gis.

5-nerved, tip and margins broadly hyaline; palea oblong acute or sub 2-dentate; keels scabrid. Lodicules obliquely ovate, sometimes 2-lobed. Anthers  $\frac{1}{6}-\frac{1}{7}$  in., linear, reduced and empty in the fem. fl. Ovary pyriform, top slightly oblique, hispidulous; styles very short, subterminal; stigmas  $\frac{1}{6}$  in., plumose, more or less fluform in the male fl.  $Grain \frac{1}{7}$  in., linear-oblong, quite free, dorsally subconvex, ventrally flat, hilum reaching rather above the middle.

- Sect. II. Vulpia. Annuals (the Indian species). Spikelets subsecund in spiciform or racemiform panicles; pedicels clavate, often very short. Glumes divergent, I minute or 0, II much shorter than the fig., long-awned. Stamens 1-3; anthers very short. Ovary glabrous. Grain linear, adherent to the palea.
- 16. F. Myuros, Linn Sp Pl. 74; panicle elongate branched below base usually embraced by the upper sheath, pedicels half the length of gl II or longer, gl. I minute, fig. gls. 5-8 as long as their awns, stamens 1-3 Host Gram. Austr. ii. 66, t. 93; Enql. Bot. t. 1412; Knapp Gram. Britt. t. 70; Kunth Enum. Pl. i. 396, Suppl. 330; Ledeb. Fl. Koss. iv. 349. F. Pseudomyuros, Soyer Willem. in Ann. Sc. Nat. Ser. I. vii. (1826) 445. ? F. uniglumis, Griseb. in Goett. Nachr. (1868) 73 (non Soland.). Vulpia Myuros, Gmel. Fl. Bad. 1. 215; Reschb. Ic. Fl Germ. i. t. 60; C. Koch in Linnæa, xxi. (1848) 409; T. Nees Gen. Fl. Germ. Monocot. i. n. 71; Boss. Fl. Orient. v. 628. V. Pseudo-myuros, Reichb. Fl. Germ. Excurs. 37. Mygalurus caudatus, Link Enum. Hort. Berol. 1. 92.

WESTERN HIMALAYA, from Kashmir to Garwhal, alt. 5-9000 ft. Western

TIBET. alt. 9-12,000 ft.-DISTRIB. Europe, N. Asia.

- Stem 6-18 in., very slender, leafy, glabrous. Leaves setneeous, upper with rather tunid grooved sheaths embracing the base of the panicle; ligule short, biauricled. Panicle 4-10 in. strict or flexuous, glabrous or puberulous, rachis and branches smooth or scaberulous, lower branches appressed, upper very short. Spikelets with the awns \(\frac{1-2}{2}\) in; rachilla smooth or ciliolate; gls. I and II subulate; flg. smooth or more or less scaberulous, nerves obscure.—I have seen no specimen of F. unglumis, Soland. from India, and suspect Grisebach's plant to be E. Myuros.
- Sect. III. NARDURUS, Reichb. (Gen.). Spikelets spicate, solitary, sessile on the joints of the rachis or with very short flat pedicels. Glumes divergent, equal or unequal; flg. gls. awned or not. Stamens 3, anthers minute. Ovary glabrous. Grain oblong or subpyriform, obtuse, ventrally concave, glabrous, adherent to the palea.
- 17. F. tenuiflora, Schrad. Fl. Germ. i. 345; leaves very short filiform subflexuous convolute, spike simple, spikelets secund sessile 3-7-fld., gls.  $I = \frac{1}{2}$  II linear-subulate acuminate keeled, flg. gls. linear-lanceolate mucronate or shortly awned smooth or hispidulous. Kunth Enum. Pl. i. 395, Suppl. 330. F. maritima, Linn. Sp. Pl. 75. Nardurus tenuiflorus, Boiss. Voy. Bot. Espan. ii 667, Fl. Orient. v. 632. N. unilateralis, Fries ex Linnea, xxix. (1857-8) 730; Fourn. in Bull. Soc. Bot. Fr. xiii. (1866) 181. Catapodium unilaterale, Griseb. in Ledeb. Fl. Ross. iv. 347. Triticum hispanicum, Willd. Sp. Pl. i. 479. T. maritimum, Willd. Lc. (in Syn.). T. Nardus. DC. Fl. Franc. iii. 87. T. tenellum, Viv. Ann. Bot. i. II. 154; Host Gram. Austr. 11. 20, t. 86 (excl. Syn.). T. unilaterale, Linn. Mant. i. 35. Brachypodium tenuiflorum & tenellum, Roem. & Sch. Syst. ii. 745 (ex Kunth).

KASHMIR; near Sirinagur, alt. 5-6000 ft., Duthie.—DISTRIB. Westwd. to Spain. Stems 3-16 in., tufted, slender, wiry erect, strict or curved, smooth. Leaves

1-3 in., erect, sometimes almost capillary, grooved between the prominent ribs, ligule 0. Spike 2-4 in , short or curved, rachts smooth, wrry, grooved,  $\frac{1}{2}$ -terete, with a shallow groove opposite the spikelets. Spikelets  $\frac{1}{8}$ - $\frac{1}{6}$  in , green; fl. gls. rigid, terete, nerves indistinct. Lodicules subcuneate, acutely 2-lobed.

#### DOUBTFUL SPECIES.

F. filiformis, Nees ex Duthie Grass. N. W. Ind. 42 is probably a Tupogon.

### 122. **BROMUS**, *Linn.* (O. Stapf).

Annual or perennial grasses. Leaves narrow, usually flat. Spikelets many-fld., panicled, laterally compressed; uppermost fls. usually imperfect; rachilla jointed below the flg. gls, not produced beyond the uppermost gl. Glumes many, I and II unequal, empty, acuminate, 1-5-nerved, persistent, flg. gls. acuminate or shortly cleft; 1- very rarely 3-awned, median awn erect or recurved sometimes twisted towards the base; palea 2-fid or 2-toothed, keels scabrid or ciliate. Lodicules 2, oblong or lanceolate, entile or cleft. Stamens 3. Ovary oblong or cuneiform, crown more or less enlarged and hairy or villous. Styles usually inserted ventrally below the tip of the ovary, short; stigmas plumose. Grain linear-oblong, usually concavo-convex and adherent to the palea.—Species about 40, natives of temp. regions.

B. unioloides, H. B. K. (B. Schraderi, Kunth; Duthie Grass. N.W. Ind. 43; Fodd. Grass. N. Ind. 67), a tall American species with many-nerved keeled gls. has been introduced into India as a fodder grass, and has been found at Daijihug and elsewhere as an escape.

Sect. I. Festucoides, Coss. & Dur. Perennial, usually tall. Gl. I 1-nerved; II 3-nerved, fig. gls. 5-7-nerved; awn terminal or nearly so or 0.

1. B. inermis, Leyss. Fl. Hall. 16; rootstock creeping, panicle large, spikelets up to 2 in., awn of fig. gls. minute or 0. Poll. Hist. Pl. Palat. 1 111, Schreb. Beschr. Graes. i. 97, t. 13; Host Gram. Austr. i. 8, t. 9; Kunth Enum. Pl. 1. 412, Suppl. 340; Ledeb. Fl. Ross. iv. 357; Steud. Syn. Gram. 321; Boiss. Fl. Orient. v. 642. B. littoreus, Georgi Beschr. Russ. Reich. Nachtr. 257; Griseb. in Goett. Nachr. (1868) 74; Duthie Grass. N.W. Ind. 43. B. purpurascens, Turcz. ex Ledeb. l. c. ?B. variegatus, Griseb. l. c. (non Bieb.). Schedonorus inermis, Beauv. Agrost. 99. Festuca inermis, DC. Fl. Fr. iii. 49; Reichb. Ic. Fl. Germ. t. 70. F. Leyssen, Moench Enum. Pl. Hass. 41. F. possides, Thuill. Fl. Paris, Ed. 11. 51. F. poneformis, Pers. Syn. ii. 94. F. speciosa, Schreb. Spicil. Fl. Lips. 59. Tragus inermis, Panz. in Denkschr. Akad. Muench. (1813) 296.

WESTERN HIMALAYA; from Kashmir to Kumaon, alt. 9-13,000 ft.—DISTRIB. N. Europe, Reg. Caucas, N. Asia.

Stem 2-4 it., often stoloniferous, nodes usually pubescent. Leaves 6-9 by \(\frac{1}{2}\)-\frac{1}{2}\) in., finely acuminate, glabrous or hairy above, smooth or scaberulous beneath, many-nerved; sheaths tight, striate; ligule very short, truncate, toothed. Panicle 6-8 in., open or contracted, erect or nodding, rachis smooth; lower branches 2-5 in, 3-4-nate, simple or sparingly divided. Spikelets pale green, rarely purplish, linear-oblong, loosely 5-12-fld., rachilla pubescent; gl. I \(\frac{1}{2}\)-\frac{1}{3}\) in., lanceolate, keeled, II \(\frac{1}{3}\)-\frac{2}{3}\) in, oblong-lanceolate, subacute; flg. gls. \(\frac{1}{2}\)-\frac{1}{3}\) in., oblong-lanceolate, obtuse, 5- sub 7-nerved, glabrous or nearly so, tip and upper margins scarious; awn up to \(\frac{1}{3}\) in; keels of palea rigidly ciliolate. Anthers \(\frac{1}{6}\)-\frac{1}{3}\) in., Grain \(\frac{1}{30}\)-\frac{1}{3}\] in., oblong, more or less folded.—B. inermis in N.E. Asia passes into B. ciliatus, L., a

characteristic form in N. America where B. inermis is absent.

Var. villosus, Mert. & Koch in Rohl. Deutsch. Flor. i 675; spikelets pubescent to villous, lower sheaths and leaves more or less hairy .- Kashmir and Gilgit.

Var. contais, Stapf; stem 12-21 ft., leaves hardly 1 in. broad hairy, panicle usually reduced to a raceme, spikelets densely pubescent. B. confinis, Nees ex Stend. Sun. Gram. 320; Duthre l. c. 42. B. pubescens, Jacquem. mss. B. Munroi. Boss Fl. Or. v. 643.-Kunawur and Gilgit.

2. B. asper, Murray Prodr. Stirp. Gotting. 42; rootstock short præmorse, panicle large, spikelets up to  $1\frac{1}{2}$  in. awn of fig. gls.  $\frac{1}{2}$  to nearly as long as the gl. straight. Host Gram. Austr 1. 6, t. 7; Engl. Bot. t. 1172 : Berchb Ic. Fl. Germ t. 76; Steud. Syn. Gram. 320; Ledeb. Fl. Ross. w. 356, Boiss Fl. Orient v. 643; Griseb in Goett Nachr. (1868) 64; Duthie Grass N.W. Ind 42. B. altissimus, Weber in Wigg Prim. Fl Holsat. 9 (non Pursh.). B. dumetorum, Lamk Fl. Fr. iu. 605 B. giganteus, Vill. Hist Pl. Dauph. ii. 118 (non Linn.) B. hirsutissimus, Cyrill. ex Roem. S. Sch. Syst ii. 643. B. hirsutus, Curt. Fl. Lond. fasc. ii. t. 8 (non Schrank.). B. montanus, Scop Fl. Carn Ed. II. i. 82 B. nemoralis, Huds. Fl. Angl Ed II. i. 51 B. nemorosus, Vill. l c. 218 B. Pseudo-asper. Schur. Enum. Pl. Transs. 804 B. ramosus, Huds. Fl. Angl. 40 (non Linn). B. serotinus, Benek. in Bot. Zeit iii (1845) 724; Steud. l. c. Festura aspera, Mert & Koch in Roehl. Deutsch. Flor. 1. 672. F. scaberrima & Wightiana, Steud. I.c. 316. Schedonorus asper, Gaud. ex Roem. § Sch & c. S Benekeni, Lange in Fl. Dan, t 2826. S. serotinus, Rostoup in Kjoeb Vidensk. Meddel. (1864) 119. S. bromoides, Wight § Ann. in Wight Cat. n 1795.—Bromus, n. 10 (partim), Herb, Ind. Or. Hf. & T.

TEMPERATE HIMALAYA, alt. 6-11,000 ft., from Kushmir to Sikkim. Khasia Hills, alt. 5000 ft., J D H. and T T., Clurks. Nilghibi and Pulney Hills, Weght; alt. 7000 ft., Clarke—Distrib. Europe, N Afr., W. and N. Asia.

Stems 2-6 it., erect, smooth. Leaves  $1-1\frac{1}{2}$  ft. by  $\frac{1}{3}-\frac{1}{2}$  in., finely acuminate, flaccid, hairy above, beneath and margins scabrid, nerves many; sheaths villous or retrorsely hirsute, upper glabrous; ligule short, obtuse, ciholate. Panicle up to 1 ft., loose, open or contracted, rachis rough or smooth below; branches 2-nate or lower 3-5-nate and unequal up to 7 in., spreading or deflexed, naked below. Spikelets linear to oblong, green, loosely 7-9-fld.; gls. rather firm; rachilla scabrid; gl I  $\frac{1}{6} - \frac{1}{3}$  in., linear-lanceolate; II  $\frac{1}{4}$ — nearly  $\frac{1}{2}$  in., broader, more oblong; III  $\frac{1}{3}$  nearly 1 in., oblong lanceolate, keeled below the tip, glabrous pubescent scabrid or side nerves, scabrid to ciliate, 5-7-nerved, tip and margin more or less hyaline; awn terminal or subterminal; palea obtuse, keels rigidly cihate. Anthers  $\frac{1}{12} - \frac{1}{8}$  in., linear. Grain  $\frac{1}{3}$  in., linear-oblong, flat tightly adherent to the gl. and palea.—The Sikkim, Khasia and some Nilghiri specimens have more acute and strongly nerved gls. than most of the N.-Western ones, but they are linked by many intermediates, and similar variations occur all over Europe.

3. B. himalaicus, Stapf; rootstock very short, panicle usually reduced to a raceme, spikelets up to 1 in., awn of fig. gl. as long as the gl. or longer recurved. B. asper, & Bromus n. 9 & 10 (partim), Herb. Ind. Or. Hf. & T.

TEMPERATE HIMALAYA; E. Nepal, Sikkim and W. Bhotan, &c., alt. 8-12,000 ft., J. D H.

Stems 2-21 ft. Leaves 6-9 by 1-1 in., finely acuminate, flaccid, hairy above, beneath and margins scabrid, many nerved; sheaths tight, glabrous or lowest hairy when young; liqule short, truncate, usually dark colrd. Pancle 5-7 in., open or contracted; rachis rough, or smooth below; branches 2-nate, or the lower 3-5-nate, spreading or deflexed, unequal, lowest up to 3 in, simple or sparingly divided. Spikelets linear-oblong, green, loosely 9-fld.; rachilla subscaberulous; gl. I  $\frac{1}{3} - \frac{1}{10}$  in., narrowly lanceolate, 1-nerved, keeled; II longer ( $\frac{3}{10} - \frac{1}{8}$  in.) and broader;

III broader and thinner than in B asper, glabious pubescent or rigidly hairy towards the margins, 5-7-nerved, scarcely keeled below the tip, tip and margins hardly hyaline; cultus large; palea obtuse, keels rigidly ciliate. Anthers linear-obloug,  $\frac{1}{20-12}$  in. Grain  $\frac{1}{6}$  in., linear-obloug, plano-convex, adherent to the gl. and palea.

Var. grandis, Stapf; branches of panicle almost all simple and bearing a solutary villous spikelet, gls. larger. B. confinis, Herb Strach. & Winterb.

-Kumaon and S.kkim, alt. 11-12,000 ft.

Sect II Stenobromus, Griseb. Annuals G1. I 1- rarely 3-nerved; II 3-5-nerved; fig. gls. 5-7-nerved; internodes of rachilla slender.

4. B. crinitus, Boiss & Hoh. in Boiss. Diagn. Ser. I. xiii. 64, Fl. Orient iii. 647; panicle rather stiff, spikelets \(\frac{1}{2}\) in. elliptic-oblong, flg gls. clavate not imbricating. Steud Syn. Gram. 320; Griseb in Goett. Nachr. (1868) 74. B gracillimus, Bunge in Mem. Sav. Etr. Petersb. vii (1851) 527; Duihne Grass. N.W. Ind. 42 Deschampsia aralensis, Regel in Bull. Soc. Nat. Mosc. xli. (1868) II. 300.

WESTERN TIBET; alt. 10-14,000 ft.; Baltistan, &c., Thomson, Duthie. Zanskar; Schlagentwert. British Beluchistan, alt. 4-5000 ft., Duthie.—Distrib. Westwd.

to Persia, Turkestan.

Stem 6-18 in., erect, slender, smooth. Leaves  $1\frac{1}{2}-3\frac{1}{4}$  by  $\frac{1}{12}-\frac{1}{10}$  in., linear, flaccid, pilose or velvety; sheaths velvety; ligule ovate, lacerate. Panaele up to 4 in., oblong, erect or subnutant, rachis smooth; branches 3-5-nate, capillary, subcrect or spreading, up to 2 in. Spikelets 3-6-fid., pale green; tachilla scabrid; gl I  $\frac{1}{7}$  in., lanceolate, acute, hyaline except along the middle; II  $\frac{1}{3}-\frac{1}{3}$  in, broadly lanceolate, tip and margins hyaline; flg. gls.  $\frac{1}{7}$  in., oblong, obtuse, strougly involute, ciliate on or near the margin, faintly 5-nerved; awn  $\frac{3}{3}$  in., capillary, straight, terminal or nearly so; keels of palea ciliate. Anthers  $\frac{3}{7}-\frac{1}{7}$  in. Grain  $\frac{1}{7}$  in., linear-oblong, laterally compressed and folded; hilum as long as the grain.

5. B. tectorum, Linn. Sp. Pl. 77; panicle flaccid nodding often secund, spikelets \( \frac{1}{2} - 1 \) in. cuneitorm, flg. gls. long narrow. Host Gram. Austr i. 13, t. 15; Sibth. Fl. Græc. i. t. 82; Fl. Dan. t. 1806; Reichb. Ic. Fl. Germ t. 73; Ledeb. Fl. Ross. iv. t. 359; Kunth Enum. Pl. 1. 419, Suppl. 344; Boiss. Fl. Orient. v. 647; Steud. Syn. Gram. 318; Griseb. in Goett. Nachr. (1868) 74; Duthie Grass. N.W. Ind. 43 B. abortiflorus, St. Amans. Fl. Agen. 44, Steud. l. c. B. arenaceus, Pourr. in Mem. Acad. Toul iii. (1788) 308. B. lateripronus, St. Laz. in Ann. Soc. Bot. Lyon. vn. (1880) 121. ?B. scabrifolus, Opiz. Natural. n. 9 (1825) 119. B. tectoriu, Dulac Fl. Haut Pyren 96. Anisantha pontica, C. Koch in Linnæa, xxi. (1848) 394; Steud. l. c. 377.

WESTERN HIMALAYA, from Gilgit to Kumaon, alt. 7-11,000 ft.; Baltistan,

Duthre.—DISTRIB. Europe, N. Africa, N. and W. Asia.

Stems 6-18 in., erect or ascending, glabrous or pubescent. Leaves up to 3 by  $\frac{1}{3}$  in., linear, acute, flaccid, hairy; sheaths bairy, rarely glabrous; ligule ovate, lacerate. Panicle up to 5 in., flaccid; rachis smooth or nearly so; branches 3-6-nate, capillary, flexuous, often decurved with erect tips, sparingly divided. Spikelets green, loosely few-many-fld., rachilla scabrid, gl. 1  $\frac{1}{3}$ - $\frac{1}{3}$  in., lanceolate, acute, 1-rarely 3-nerved, tip and margins hyaline; II  $\frac{1}{3}$ - $\frac{1}{3}$  in., oblong-lanceolate, 3-5-nerved; flg gls.  $\frac{1}{2}$ -nearly  $\frac{2}{3}$  in., thin, oblong-lanceolate, acutely 2-fld, 5-7-nerved, puberulous or scabrid above or all over, tip and margins hyaline; awn  $\frac{1}{3}$ - $\frac{3}{4}$  in., from the tip or below it, straight or slightly recurved; keel of palea long and loosely ciliate. Anthers  $\frac{1}{23}$  in. Grain  $\frac{1}{3}$ - $\frac{2}{3}$  in., linear-oblong, dorsally compressed, ventrally concave or folded.—The form with a solitary flg. gl. (B. abortiflorus, St. Amans) may be expected to occur in N. India.

Sect. III. Serrafalcus, Parl (Gen.) Annuals. Gl. I 3-5- rarely 1-nerved; II 5-9-nerved; fig. gls. 7-9-nerved; internodes of rachilla clavate above.

- \* Flg. gls. all 1-awned. Panicle compact, rurely loose, branches short.
- 6. B. scoparius, Linn. Cent. Pl. i. 6, Sp Pl 76; panicle very compact oblong to obovate, spikelets densely fascicled about  $\frac{1}{3} \frac{1}{2}$  in., fig. gls. oblong obtuse, awn = the gl at length spreading Kunth Enum Pl. i. 420; Bory Exped. Morée, t.5; Steud. Syn. Gram 318; Boiss. Fl. Orient. v. 650. B. confertus, Bieb. Fl. Taur Cauc. i. 71; Steud. l. c. 324; Duthie Grass. N.W. Ind. 42. B. chrysopogon, Viv. Fl. Lyb. Spec. 4, t. 2; Steud. l. c. 327. B. erectus, Mois Stirp. Sard. Elench. 1. 50 (non Huds). B. humilis, Cav Ic. vi. 65, t. 589. ?B. 1ubens, Cav. l. c. t. 45 (non Linn.). Serrafalcus scoparius, Parl Fl. Ital. i. 19 S. Cavanillesu, Willk. & Lange Prodr. Fl. Hisp i. 101.

Kashmir, alt. 5-6000 ft., Falconer, Duthie.—Distrib. Reg Mediterr, Oriens. Annual. Stems  $\frac{1}{4}$ -1 $\frac{1}{2}$  ft., elect, slender, glabrous. Leaves 2-3 $\frac{1}{2}$  in. by  $\frac{1}{6}$  in, linear, acute, hairs scattered stiff; sheaths tight, glabrous, mouth hairy; ligule short, truncate, toothed. Panicle 1-1 $\frac{1}{4}$  in, erect, compact; ruchis smooth; brunches solitary or binate, short, crowded, scaberulous. Spikelets  $\frac{1}{10}$ - $\frac{1}{4}$  in. broad, pale green, densely 5-8-fld., 1achilla scaberulous; glumes glabrous or hairy, nerves strong; gl. I  $\frac{1}{4}$  in, ovate-lanceolate, acute or subacute, 3-5-nerved; II  $\frac{1}{4}$  in., 5-7-nerved; flg. gls.  $\frac{1}{4}$  in., minutely 2-fid, 7- sub 9-nerved; awn slender; keels of obtuse palea loosely long-culiate. Anthers  $\frac{1}{30}$ - $\frac{1}{40}$  in. Grain  $\frac{1}{30}$  in., linear-oblong, flatly concavo-convex or folded.

7. B. mollis, Linn. Sp. Pl. Ed. II. 112; panicle compact or loose but contracted ovate to oblong branches distinct, spikelets \( \frac{1}{2} \) \( \frac{3}{4} \) in ovate-oblong or elliptic, awn about as long as the gl. straight. Host Gram. Austr. i. 16, t. 19; El. Dan t. 1324; Engl. Bot. t. 1078; Knapp Gram. Britt. t. 77; Reichb. Ic Fl. Germ. t. 74; Schreb. Beschr. Gram. t. 6, f. 1; Kunth Enum. Pl. i. t. 413, Suppl. 340; Steud. Syn Gram. 323; Ledeb Fl. Ross. iv. 361; Steud. Syn. Gram. 323; Boiss. Fl. Orient. v. 653; Duthie Grass N.W. Ind. (Royle's plant only) B. arenarius, Thomine Desm. in Mem. Soc Linn. Calv. (1824) 40 (non Labill.). B. atticus, Steud. ex Nym. Consp. 823; Syn. Gram. 321. B. compactus, Hort. ex Steud. Nom Ed. II. ii 227. B. Ferronii, Mabelli in Act. Soc. Linn. Bord. xxv. (1864) 613. B. glomeratus, Tausch in Flora, xx. (1837) 125 (ex Boiss.); Steud. l. c. 328. B. hordeaceus, Linn. Sp. Pl. 77. B. nadus, Weig Obs. 8. B. patulus, Duthie Grass. N.W. Ind. 42 (in part) B simplicissimus, Cesati ex Nym. l. c. Serrafalcus mollis, Parl. Rar. Pl. Sic. ii. 16. S. Thomini, Hard. in Congr. Sc. Fr. Septr. I. (1833) 59.

NORTH-WEST INDIA, Herb. Royle (Introd.?).—DISTRIB Europe, N. Afr., As. Min.

Annual. Stems \(\frac{1}{2}\)-3 fi., erect or ascending, villous to glabious. Leaves \(\frac{1}{2}\)-4 in., linear, acute, flaccid, subhirsute above, pubescent beneath; sheaths velvety or softly hairy; ligule very short, denticulate, glabrous or hairy. Panucle 1-6 in., erect, rachis hairy; branches 3-6-nate, scabrid or softly pubescent. Spikelets \(\frac{1}{2}\)-\frac{1}{2} in. broad, pale green, densely 5-12-fld., rachilla scaberulous; gls. broad, hairy to velvety, rarely glabrescent, nerves strong, tips and margins scarious; Il \(\frac{1}{2}\)-\frac{3}{2} in., ovate-lanceolate, acute or mucronate, 5-nerved, midrib percurrent; II \(\frac{1}{2}\) in., ellipticoblong, 7-9-nerved; fig. gls. \(\frac{3}{2}\)-\frac{1}{2} in., broadly subobovate, obtuse, shortly 2-lobed, 7-nerved, awn subterminal as long or rather shorter than the gl.; palea obtusely

2-lobed, keels loosely long-cihate Anthers  $\frac{1}{7}$  in., oblong. Grain  $\frac{1}{5}$ — $\frac{1}{4}$  in., linear-oblong, flatly concavo-convex or folded, tightly adherent to the gl. and palea.

- \*\* Flg gls all 1-awned, or some 3-awned in B. macrostachys. Panicle loose, open or contracted.
- 8. B. patulus, Mert. & Koch in Rohl. Deutsch. Flor. i. 685; panicle linear-oblong usually nodding often secund branches long slender up to 6 in., spikelets  $\frac{3}{4}-l\frac{1}{2}$  in. linear-oblong, awn about = the gl usually recurved. Kunth Enum. Pl. i. 415; Reichb Ic. Fl Germ. t 74, Ledeb. Fl. Ross. iv 364; Boiss Fl. Orient v. 655; Steud Syn. Gram 325, Griseb. in Goett. Nachr. (1868) 74; Duthie Grass. N.W. Ind. 43. B. annuus, Herb Jacquem. B. anatolicus, Boiss. et Heldr. in Boiss Diagn Ser 1. xiu. 63. B arvensis, Duthie l.c. 42 (non Linn.); Herb. Ind. Or. Hf. & T. B chapprianus, De Not ex Nym. Consp 824. B. commutatus, M. Bieb. Fl. Taur Cauc. 111 77 (non Mert. & Koch.). B. Cyri, C. A. Mey. Verz Pfl. Cauc 24. B. japonicus, Thunb. Fl. Jap. 51, t 11; Franch & Sav. Enum. Pl Japon ii. 181 (nom. prius). B. Kochii, C. Gmel Fl Bad iv. 76, t. 6 B mollis, Duthie l'c. B multiflorus, Host Gram. Austr. 1. (excl exempl. Royle) t. 11 (nom Sm.). B. pendulus, Schk. in Verh Siebend. Ver. Naturn. iv (1853) 90. B. phrygius, Boiss Diagn. Ser II. iv. 140. B. polymorphus, Hoh. Enum Pl Talusch. 19. B. secalinus, M Bieb l.c. i. 71 (non Linn). B. squarrosus, Herb. Royle; Herb. Strach & Winterb. (Bromus, n. 3): Duthie l.c. (non Linn.). B unilateralis, Schur. l.c. B velutinus, Nocc. et Balb. Fl Tic. i. 54 (non Schrad.). B. villiferus, Steud. Syn Gram. 326 (in part). Serrafalcus patulus, Parl. Fl. Ital. i. 394.

WESTERN HIMALAYA, alt. 6-14,000 ft. Bhotan, Griffith.—DISTRIB. Europe, W. and N. Asia, China, Japan.

Annual. Stems 1-2 ft., erect or ascending, glabrous or puberulous. Leaves up to 8 by  $\frac{1}{2}$  in., linear, acute or subacute, green, flaccid, hairy especially above; sheaths rarely all glabrous or hairy; ligule short, ovate, toothed. Panicle up to 8 in., narrow or open; rachis glabrous or pubescent; branches solitary or 3-7-nate, unequal, 1-4-spiculate, slender, flexuous, lower up to 6 in. long, simple or racemose, suberect spreading or nodding, scabrid at least above. Spikelets densely or loosely 7-14-fld., pale green; rachilla scabrid; gls. rather narrow, thin between the prominent nerves;  $I_{\frac{1}{6}-\frac{1}{4}}$  in., lanceolate, subacute, pubescent or scabrid, 3-nerved, tips and upper margins hyaline, II  $\frac{1}{10}-\frac{1}{8}$  in., oblong-lanceolate, 7-nerved; flg. gls.  $\frac{1}{8}-\frac{1}{4}$  in., elliptic-oblong or -lanceolate, subacute or obtu-e, 2-toothed, margins inflexed from the middle or above it; awn  $\frac{1}{10}-\frac{1}{7}$  in., infia-apical, base rather stout, not or obscurely twisted; keels of palea loosely long-ciliate. Anthers  $\frac{1}{10}-\frac{1}{2}$  in. Grain  $\frac{1}{3}-\frac{2}{3}$  in., linear-oblong, more or less concavo-convex, tightly adherent to the gl. and palea.—Griffiths' Bhotan specimen is a solitary one, probably introduced. The following are rather abnormal forms than varieties.

Var. Falconers, Stapf; panicle very loose villous, gl. I narrowly lanceolate 1-nerved, II 5-nerved, fig. gls. 7-nerved.—B tomentellus, Duthie l. c 43 (non

Boiss.).-N.W. India, Falconer.

Var. microstachya, Stapf.; spikelets small few-fid, gl. broader, I  $\frac{1}{4}$  in 3-5-nerved, II  $\frac{1}{4}$  in 7-9-nerved, fig. gls.  $\frac{1}{4}$   $\frac{3}{10}$  by  $\frac{1}{8}$  in broad.—N.W. India, Falconer.

9. **B. oxyodon**, Schrenk Enum. Pl. Nov. ii 1; panicle usually stiff suberect oblong contracted, branches up to 2 in, spikelets  $1\frac{1}{2}$  in. linear or linear-oblong, fig. gls. broadly hyaline. awn  $\frac{3}{4}$ —1 in. Stend. Syn. Gram. 326. B. macrostachys, var. oxyodon, Griseb. in Ledeb Fl. Ross. iv. 363. B. multiflorus, Kar. & Kiril. in Bull. Soc. Nat. Mosc. (1841) 865.

KASHMIR, DRAS, BALTISTAN, ZANSKAB, &c, alt. 9-12,000 ft., Thomson, &c. -- DISTRIB. -- Turkestan.

Annual. Stems 6-18 in., erect or ascending, pubescent or subvelatinous Leanes 2-5 in., linear, narrow, subacute, hairy or velvety; young sheaths villous; ligule ovate, lacerate. Panele up to 5 in., usually contracted, erect, rachis pubescent; branches 2-5-nate, unequal, suberect, rarely nodding, scabrid, simple 1-3-spiculate. Spikelets pale green, densely 5-10-fld.; rachilla puberulous; gls. 1ather narrow, glistening, scabrid with appressed hairs, tips long-hyaline, nerves prominent; I  $\frac{1}{3} - \frac{2}{5}$  in., lanceolate, 1-3-nerved; II  $\frac{9}{10} - \frac{1}{10}$  in., oblong-lanceolate, 5-nerved; flg. gls  $\frac{1}{2} - \frac{3}{2}$  by  $\frac{1}{3} - \frac{1}{3}$  in, oblong-lanceolate, maigins inflexed below the midule, subicute, 2-toothed, 7-9-nerved; awn  $\frac{5}{4} - 1$  in., intra-apical, nearly straight or moderately recurved; keels of palea loo-ely long-ciliate. Anthers  $\frac{3}{10} - \frac{3}{5}$  in. Grain  $\frac{1}{10} - \frac{1}{4}$  in., linear-oblong, slightly concavo-convex

10. **B. macrostachys,** Desf Fl. Atlant i. 96, t. 19, f. 2, var. triaristatus, Hack in Flora (1879); panicle oblong or obovate-oblong loose or contracted, spikelets  $1\frac{1}{2}-1\frac{3}{4}$  in. elliptic to linear-oblong, fig. gls. all or the upper only with 2 straight slender lateral awns, median awn  $\frac{1}{2}-\frac{3}{4}$  in. tinally twisted and strongly recurved. B. Danthoniæ, Trin. in C. A. Mey. Verz. Pfl Cauc. 21; Sp. Gram. Ic. t. 353; Duthie Grass N.W Ind. 43. Boissiera Danthoniæ, A. Br. Ind. Sem. Hort. Berol. (1857) 3. Triniusa Danthoniæ, Steud. Syn. Gram. 328.

WESTERN TIBET; Spiti, alt. 12,000 ft., Lance - DISTRIB Affghan., Turkestan,

As. Min. (of B. macrostachys, M-diterianean regions, Persia).

Annual Stem 6-18 m, erect or ascending, glabrous or pubescent. Leaves 2-5 in., narrowly linear, acute or subacute, more or less hairy or velvety; young sheaths villous or velvety; ligule ovate, lacerate. Panicle up to 5 in., sometimes reduced to a spikelet, rachis glabrous or pubescent; branches solutary or the lower 3-4-nate, unequal, rarely I in., simple, 1-2-spiculate, strict, suberect, scabrid, rarely flexuous. Spikelets pale green, densely 6-20-fid.; rachilla pubescent; gls. broad, villous velvety or scabrid, t ps and margins usually scarious and dull white, nerves prominent or not; gl. I  $\frac{1}{3}$ - $\frac{1}{3}$ 0 in.; broadly lanceolate, 5-nerved; II about  $\frac{1}{3}$  in., oblong, 7-9-nerved; flg. gls.  $\frac{2}{5}$ -nearly  $\frac{1}{2}$ 1., elliptic to obovate-oblong, subacute, 2-toothed, 9-11-nerved, margins inflexed from or from above the middle; lateral awns  $\frac{1}{3}$ - $\frac{1}{3}$  in, median  $\frac{1}{2}$ - $\frac{3}{3}$  in., infra-apical, often purplish, base stout; keels of palea long-chate. Anthers nearly  $\frac{1}{2}$ - $\frac{3}{3}$  in., rarely  $\frac{9}{10}$  in. Grain  $\frac{3}{10}$ - $\frac{1}{3}$  in, linear-oblong, slightly concavo-convex, tightly adherent to the gl. and palea; hilum almost as long as the gl.

#### DOUBTFUL SPECIES.

B MEMBRANACEUS, Jacquem. mss.; Griseb. in Goett. Nachr. (1868) 74 Duthie Grass. N.W. Ind 43 is Duthiaea bromoides, Hack. (see p. 282)

123. DUTHIEA, Hack. See p. 282.

## 124. BRACHYPODIUM, Beauv.

Perennial slender grasses. Leaves flat or convolute. Spikelets terete, many-fld., subsessile or in a long slender spike appressed to the rachis; rachilla elongate and jointed below the fl gls. Glumes many, imbricate in fl, spreading in frt; I and II persistent; empty, narrow; flg. gls. oblong-lanceolate, acuminate, with a terminal straight awn or mucro, 7-9-nerved; keels of palea pectinately ciliate. Lodicules ciliate. Stamens 2-3, authers linear. Ovary and grain as in Bromus—Species 5 or 6, of north temp. and mt. regions.

1. **B. sylvaticum,** Beauv. Agrost. 101; roots fibrous, leaves more or less harry or scaberulous flat, spike drooping, awn as long as its gl. Thw. Enum. Pl. Zeyl. 374; Trim. Cat. Ceyl. Pl. 110; Ledeb. Fl. Ross. iv. 346;

Boiss. Fl. Orient v. 657. B Fontanesianum, Nees Fl Afr Austr. 457. B. Fontanesii, Ness in Herb Ind. Or. Hohenack. n. 914 B gracile, Beaur. l.c.; Reichh. Ic Fl Germ. t. 16. B nepaleuse, Nees ex Steud Syn. Gram. 316. B. seaberrimum, Wight & Arn. in Wight Cat. n. 1796; Steud. Nomencl. Ed. II 1. 221. Bromus silvaticus, Pollich Hist Pl. Palat. i. 118; Host Gram. Austr. 1 17, t. 21; Engl. Bot. t. 729 B. dumosus, Vill. Hist. Pl. Dauph. n. 119 B gracilis, Weig. Obs. 15, t. 1, f. 11 B. pinnatus, Fl. Dan. t. 164 (non Beauv) Feriuca gracilis, Moench Meth. 191. F. svivatica, Huds. Fl. Angl. Ed. I. 38; Knapp Gram. Britt. t. 76; Steud. Syn Gram. 316 Triticum sylvaticum, Moench Enum. Pl. Hass. 54; Kunth Enum. Pl.1. 415 T. gracile, Brot. Fl. Lusit. 121. T. scaberrimum, Steud. Nom. lc. 717. Tragus gracilis, Panz. in Denkschr. Akad Muench. (1813) 296.—Festuca, Wall. Cat. n. 3800.

TEMPERATE HIMALAYA, alt 6-12,000 ft, from Kashmir to Sikkim. The Khasia and Naga Hills, alt. 4-6000 ft., Clarke, &c. Nilghiri Hills, alt. 6000 ft., Wight, &c.—Ceylon, alt. 8000 ft., Walker, &c.—Distrib. Europe, N. Asia, S Africa.

Stem 2-4 ft., very slender, simple or branched. Leaves  $\frac{1}{3}-\frac{2}{3}$  in. broad, usually flaccid, finely acuminate; sheaths more or less harry; ligule short, obtuse. Spikes 2-6 in., or more, nodding; rachis compressed, glabrous, edges ciholate Spikelets 8-18 by  $\frac{2}{3}-1$  in., green, glabrous sparsely hairy or scaberulous, nerves strong; gl. I and II strongly nerved; I subulate,  $\frac{1}{3}$  shorter than II or less; II oblong-lanceolate, acute acuminate or shortly awned; fig gls. about  $\frac{1}{3}$  in long, gradually narrowed into a slender erect awn, 7-nerved; awn  $\frac{1}{3}-\frac{1}{3}$  in. Anthers  $\frac{1}{3}-\frac{1}{3}$  as long as the palea.—The characters of the following varieties are far from constant.

Var. longe-aristatum, Hook. f.; flg gl. ½ in., awns ½-¾ in.—N W. Himalaya; Kumaon and Dalhousie, alt 6-9000 ft.

Var. khasianum, Hook. f.; callus of fl gl. villous awn up to 1½ in.—Khasia Hills. Var. Watlii, Hook f.; stem stouter, lower spikelets pedicelled, pedicel of lowest half as long as the spikelet or less pubescent, awn about as long as the gl B. Wattii, Clarke in Journ. Linn. Soc. xvv. (1887) 90, t. 40.—Naga Hills, alt. 5500-7500 ft., Clarke.

Var. Pseudo-distachyon, Hook. f.; stem short 10-18 in. strict, leaves very narrow erect, spikelets few closer together, awn = half the gl. or shorter.—Kashmir and Kumaon.

2. B. pinnatum, Beauv. Agrost. 101, t. 19, f. 3; rootstock creeping, leaves convolute, spike erect, fig. gls. mucronate. Ledeb. Fl. Ross. iv. 345; Boiss. Fl. Orient. v. 658; Reichb. Ic. Fl Germ. t. 16, 17; T. Nees Gen. Fl. Germ. Monocot. 1. t. 70. B. Barrelieri, Roem. & Sch. Syst. ii. 741. B cœspitosum, Roem. & Sch. l. c. 737; Reichb. l. c. t. 17; Host Gram. Austr. i t. 22. B. constrictum, Pesl Cyp. & Gram. Sic. 40. B. corniculatum, DC. Fl. Franc. v. 608. B. rupestre, Roem. & Sch. l. c. 736; Host l. c. iv. t. 17, 18 Biomus gracilis, Leys. Fl. Hal. 26. B. pinnatus, Linn. Sp. Pl. 78; Host Gram. Austr. i t. 22; Engl. Bot. t. 730. Festuca pinnata, Momch. Meth. 191; Huds. Fl. Angl. Ed. II. 1. 48; Knapp. Gram. Britt. t. 75. Titicum bromoides, Weber ex Wigg Prim. Fl. Holsat ii. T. gracile, DC. Fl. Fr. iii. 84. T. macrourum, Turc in Bull. Soc. Nat. Mosc. (1838) 105. T. phœnicioides, DC. l. c. vi. 284. T. pinnatum, Moench Enum. Pl. Hass. 53; Kunth Enum. Pl. i. 445, Suppl. 364, t. 35. Tragus pinnatus, Panz. in Denkschr. Acad. Muench. (1813) 256. Avena laeta, Salssb. Prodr. 22.

KASHMIR; alt. 6000 ft., Clarke.—DISTRIB. Eastwd. to Europe, N. Asia. Glaucous. Stem 1-3 ft., very slender, naked above, smooth. Leaves rigid, almost glabrous, rarely flat; ligule ciliate. Spike 1-6 in.; rachis flattened, smooth.

Spikelets 3-11 in, erect, recurved from the rachis, glabrous or pubescent, green and purplish. Glumes coriaceous; I 5-nerved; II 7-nerved; fig. gls. oblong, mucronate, 5-nerved.

### Tribe X. HORDEÆ. (See p. 8.)

### 125. LOLIUM, Linn.

Erect annual or perennial grasses. Leaves flat or convolute. Spikelets many-fid, solitary, sessile in the alternating distichous hollows of a terminal marticulate spike, with the back of the lowest fl. gl. towards the rachis. rachilla jointed. Glumes many, I 0, except in the terminal spikelet; II erect, rigid, persistent, many-nerved, empty, margins not involute; fig. shorter than the empty, oblong, obtuse, acute or awned, dorsally rounded. 5- many-nerved; keels of palea ciliolate or serrulate. Lodicules 2, fleshy. Stamens 3. Oury glabrous, styles terminal, feathery to the base, Grain glabrous, adherent to the palea.—Species few, of the temperate Old World.

The Italian Rye-grass. L. multiflorum, Lamk. (italicum, A Br.) is a cultivated form of L. perenne.

1. L. temulentum, Linn. Sp. Pl. 83; annual, leaves flat, spikelets oblong-cuneate 3-8-fid., empty gl. linear many-nerved equalling or exceeding the rest of the spikelet, fig. gls. elliptic acute or awned. Fl. Dan. t. 160; Host Gram. Austr. t. 26; Engl. Bot. t. 1124; Knapp Gram. Britt. t. 101, Reichb. Ic Fl Germ t. 5: T. Nees Gen. Fl Germ. Monocot. 1. t 78; Steud. Syn. Gram. 340; Kunth Enum. Pl. i. 437; Ledeb. Fl. Ross. iv. 345; Boiss. Fl. Orient. v 681; Benth. Fl. Austral. vii. 667; Aitchis. Cut. Panjab Pl. 171; Wall. Cat. n. 3790; Duthie Grass. N.W. Ind. 44, Fodd. Grass. N. Ind. 68. L. annuum, Lamk Fl. Fr. ii. 620. L. arvense, With. Arr. Brit. Pl. Ed. III. ii. 168. Craepalia temulenta, Schrank Baier Fl. 1, 382.

The UPPER GANGETIC PLAIN, the PANJAB, SIND, and WESTERN HIMALAYA,

alt 4-6000 ft.-DISTRIB. Europe, N. Asia (introd. elsewhere).

Stem 6-18 in., erect, usually stout. Leaves 1-1 in broad, and sheaths smooth or scaberulous; ligule very short. Spike 6-10 in., strict, rachis stout. Spikelets very variable in size and shape, longer or shorter than the internodes; gl. I 1-2 in., rigid, erect; fl. gls. 1-2 in., awn 1 in. or shorter, or 0. Var. speciosum, Griseb. in Ledeb. l. c.; spike very stout, gl. I large, flg. gls.

short turgid obtuse. L. speciosum, Sten. ex Bieb. Fl. Taur. Cauc. i. 80. L. robustum,

Reichb. Ic. Fl. Germ. xi. II. t. 4.—Westein Himalaya (introd.?).

2. L. rigidum, Gaud, var. Dothiei, Hack. mss.; annual, stem and spike very slender strict erect, leaves short narrow, spikelets narrowly oblong closely appressed to the rachis 3-6-fld., empty gl. rather shorter than the rest of the spikelet oblong-lanceolate subacute 5-ribbed, fig. gls. elliptic subacute 5-nerved scaberulous above the middle narrowed at the hyaline apex into a slender terminal awn or awn infra-apical.

KASHMIR; near Sirinagur, alt. 5-6000 ft., Duthre (no. 10,846) .- DISTRIB. of L.

rigidum, westward to the Caucasus and S. Europe.

I adopt Hackel's determination of this grass, which differs from L. rigidum proper in the narrower spikelets closely appressed to the rachis of the spike, and in the awned glumes, a character to which there is no approach in any of the numerous

specimens of L rigidum which I have examined The awns are as long as the gls. or lorger.

3. L. perenne, Linn. Sp. Pl. 83; perennial, leaves linear complicate in vernation, spikelets oblong 3-11-fid., empty gl. 3-5-ribbed, shorter than the rest of the spikelet, fl. gls. oblong-lanceolate obtuse or sub-acute 5-nerved awned or not. Fl. Dan. t. 747; Host Gram. Austr i. t. 25; Engl. Bot. t. 315; Knapp Gram. Britt. t. 180; Reichb. Ic Fl. Germ. t. 8; T. Nees Gen. Fl. Germ. Monoc i. n. 78; Kunth Enum Pl. i. 436, Suppl. 358, t. 33, f 1; Ledeb. Fl. Ross iv. 343; Boiss. Fl. Orient. v. 679; Duthie Grass. N.W. Ind. 44, Fodd. Grass. N. Ind. 68. L. vulgare, Host l. c. t. 25.

WESTERN TIBET, alt. 15,000 ft., Stolizka (Duthie); Sikkim Himalaya, alt. 7000 ft., Clarke (introduced).—DISTRIB. Europe, N. Asia.

Probably not indigenous in India, though likely to occur in temperate regions. Its perennial character and stoloniferous habit at once distinguish it.

# 126. LEPTURUS, Br.

Small slender grasses. Leaves flat or convolute. Spikelets 1-2-fld., sessile, solitary, \( \frac{1}{2} \) immersed in hollows of the raches of a simple terminal articulate or not straight or incurved spike, with the back of the lowest fl gl. opposite the raches; rachilla jointed. Glumes 3 or 4, I minute or 0; II longer than the flg. gls., linear, rigid, acute, 5-nerved, erect or at length deflexed; III and IV much shorter than II, hyaline; palea 2-keeled. Lodicules 2, cureate or lobed. Stamens 1-3. Ovary glabious; styles short, distant. Grain narrow or oblong, glabrous, free.—Species 6, natives of the Old World.

1. L. repens, Br. Prodr. 207; perennial, creeping, spikes shortly peduncled tragile, gl. I 0, II acuminate or sub-aristate many-nerved much longer than the fig. gls. Brongs. in Duperr. Voy. Bot. 57, t. 16, Kunth Enum. Pl. i. 463, Suppl. 374; Steud. Syn. Gram. 357; Trim. Cat. Ceyl. Pl. 110; Benth Fl. Austral. vii. 668. L. aciculatus, Steud. l. c.; Miq. Fl. Ind. Bat. iii. 403. Rottboellia repens, Forst. Prodr. 9. Monerma repens, Beauv. Agrost. 117. Lolium coelorachis, Forst. in Herb. Paris, Steud. Nom. Ed. 11. ii. 64.

CEYLON; near Colombo, Trimen.—DISTRIB. Malay and Pacific Islds., Australia. Stem elongate, woody branched and widely creeping below. Leaves 3-6 by \$\frac{1}{2}\$-\$\frac{1}{2}\$ in., spreading or erect, acuminate, glaucous; sheaths glabrous or mouth ciliate; ligule inconspicuous. Spikes 2-6 in., strict, erect; rachis glabrous. Spikelets 2-fid., rachilla elongate bearing an upper imperfect fi.; empty gls. 1 (or 2 in the uppermost spikelet) flat, rigid, \$\frac{1}{2}\$-\$\frac{1}{2}\$ in. long, closely appressed to the rachis; fig. gls. much shorter than the empty, elliptic, concave, 3-nerved; palea 2-keeled. Lodicules fleshy, obliquely truncate or 2-lobed, glabrous. Grain oblong.

2. L. Roxburghianus, Steud. Syn. Gram. 357; annual, erect, spikes long-peduncled very slender inarticulate, gl. I minute ovate, II linear-oblong acute rather shorter than the fig. gls. Rottboellia biflora, Roxb. Fl. Ind. i. 357 (non Roth); Kunth Enum. Pl. i. 467. R.? Roxburghiana, Schult. Mant. ii. 430.

DECCAN PENINSULA, Rowburgh. EASTERN PANJAB, dry hills in Hissar, Herb. Duthie

Whole plant 8 in. high, densely tufted. Leaves 3-4 in., filiform or setaceous.

flexuous, flattened, margins ciliate with long strict hairs; sheath very short; ligule minute, 2-auricled. Spikes 2-3 in, as long as the filiform pedicels and hardly stouter, stric', erect. Spikelets \(\frac{1}{10}\)-\frac{1}{5}\) in. 2-fid., both fi. bisexual (always?); gl. I sunk in the hollow of the rachis, obliquely ovate, 1-nerved, hyaline; II linear-oblong, acute, corraceous, dorsally smooth, convex with a broad undefined midrib; III hyaline, distinctly 3-nerved, oblong, truncate, callus penicillate; palea hyaline, keels smooth; IV narrower than III; rachilla slender, penicillate. Lodicules minute Anthers very short; filaments long. Ovary short; styles short, bases remote, divergent.—There is in Royburgh's unedited Icones an excellent drawing of a small state of this plant, of which I have no specimen but Mr. Duthie's; it is no doubt overlooked from its small size and habit

### 127. OROPETIUM, Tran.

A very small densely tufted erect annual. Leures fitiform very minute. 1-fld., half immersed in the alternating distichous cavities of the rachis of a simple slender curved marticulate spike; rachilla bearded. Glumes I and II empty, persistent, I very minute, hyaline; II linear-lanceolate, rigid, recurved in fruit, tip obtuse or emarginate; III shorter, broader, hyaline, obtuse or truncate, 1-nerved; palea narrow, keels smooth. Lodicules 0° Stamens 3. Styles short. Grain oblong, terete, free.

Nardus stricta, Linn, is, according to Stewart, "Panjab Plants," p 257, a native of the Trans-Indus district, and at a considerable elevation in the Jhelum basin. This is no doubt an error. Boissier gives as its Eastern limit, the Caucasus.

O. Thomaeum, Trin. Fund Agrost. 98, t. 3; Kunth Enum. Pl i. 464, Suppl. 375; Mvy. Fl. Ind. Bat. m. 403, Thw. Enum Pl. Zeyl 363; Trim. Cat. Ceyl Pl. 110, Wall Cat n. 8869; Wight Cat n. 1727; Duthie Grass. N. W. Ind. 45, Fodd Grass N. Ind. 69. Rottboellia Thomæa, Koeng in Naturf. xxii. (1788) 210, Willd. Sp. Pl. 1. 464; Roxb. Pl Gorom. 11. 17, t. 133, Fl. Ind. 1. 357; Dalz. & Gibs. Bomb. Fl. 300. R. pilosa, Willd l c 465. Nardus Thomæa, Linn. f. Suppl. 105; Sm. in Trans. Linn Soc 1. 116.

PLAINS OF INDIA; from the Panjab to Bengal, Burma, and southward in the

Western Peninsula. Ceylon, Gardner.

Whole plant 2-3 in. high, forming hard tufts, stems compressed. Leaves ½-1 in., erect, margins ciliate with long strict hairs; sheath short, open; ligule lacerate, not auricled. Spikes 1-1; in., about 10 in. diam., solitary or fascicled on very short branches, curved; rachis undulating, green, tetragonous, with a broad central nerve on the flat faces. Spikelets in , closely appressed to the rachis in the hollow of which the minute gl. I is sunk, gl. II slightly convex with a broad thickened centre; III semicircular in profile, excessively membranous, keel most minutely scabrid.

## 128. TRITICUM, Linn.

Annual or biennial grasses. Leaves flat. Spikelets few-fld, tumid, sessile, distichously spicate, solitary, with their sides opposite cavities in the articulate or inarticulate rachis; upper fl. male or neuter. Glumes rigid, often unequal-sided, I and II empty, obtuse or shortly awned, fewnerved, persistent; fig. gls. oblong or ventucose, dorsally rounded or keeled above, awnless or 1-3-awned, 5-9-nerved, lateral nerves not conniving with the central; keels of palea ciliate. Lodicules entire, ciliate. Stamens 3 Styles very short. Grain grooved ventrally, often harry, free or adherent to the palea - Species about 10, Oriental and Eastern Asiatic.

Sect. I. TRITICUM, proper. Glumes keeled.

T. VULGARE, Vill. Hist. Pl. Dauph. 11. 153; Host Gram. Austr. iii. 18, t. 26; Wall. Cat. n. 2334 Kunth Enum. Pl. 1. 438, Suppl. 360, t. 34; T. Nees Gen Fl. Germ. Monoc i. t. 79; Artchis. Cat Panyab Pl. 171. T. sativum, DC. Fl Fr 11. 625; Lam. Encycl 11. 554, Duthie Grass N. W. Ind. 45, Fodd. Grass. N. Ind. 68.

Cultivated in many parts of NORTHERN INDIA and the DECCAY PENINSULA.

especially in the N.W., and up to 13,000 ft. in the HIMALAYA and TIBET

It is beyond the scope of this work to detail the races of wheat cultivated in India, for which I must refer to Murray's article in Watts' "Dictionary of the Economic Products of India," and to Koernecke & Werner's "Handle der Getreide Arten," in 209 All are believed to have been derived from T. monococcum, Linn, a native of the East from Greece to Mesopotamia. Hackel, the latest botanical writer on the wheats (in Engler & Prant. Planzenfam. ii 80), regards all as referable to three species, monococcum, sativum, & polonicum, Linn. (the last is not cult. in India). According to Murray and others the following races are cultivated in India as elsewhere.—T. setivum, Linn Sp. Pl. 86; Roxb. Fl. Ind. i. 359, Grah. Cat. Bomb. Pl. 234, Dalz. & Gibs. Bomb. Fl. Suppl. 97. T. amyleum, Ser Mel. Bot. 1. 124. T. compactum, Host Gram. Austr. iv. 4, t. 7. T. compositum, Linn. Sp. Pl Ed. II. 126. T. decoccum, Schrank Fl. Baser, i. 389. T. durum, Desf. Fl Atlant. 1. 114; Stewart Panjab. Pl. 262. T. hybernum, Linn. Sp. Pl. 80, Roxb l. c. T. Spelta, Linn. l. c.; Host l. c. iii. 31, t. 30. T. Zea, Host l. c. t. 29. T. turgdum, Linn l.c.; Host. l. c. t. 28.

Dalz. & Gibs. have also, as cultivated in the Concan, a T. pilosum, Dalz. & Gibs. Bomb. Fl. Suppl. 97, the "Buckshee wheat" with tomentose spikelets. I have

seen no specimens of it.

Sect. II. ÆGILOPS. Glumes dorsally rounded, not keeled.

T. Higilops, Beauv. Agrost. 180; annual, leaves linear flat, spike elongate cylindric fragile, spikelets oblong turgid 3-5-fld. half sunk in hollows of the rachis, gl. I and II similar oblong-quadrate many-nerved, fl. gls. rather longer awnless or in the upper spikelets with one strict erect awn. Ægilops squarrosa, Linn. Sp. Pl. 1051; Tausch. in Flora, xxxix. (1837) 108; Kunth Enum. Pl. i. 458, Suppl. 371; Jaub. § Spach. Ill. Pl. Or. iv. 12, t. 310, Schreb. Gram. ii. t. 27, f. 2; Cav. Ic. t. 90; Ledeb. Fl. Ross. iv. 326; Boiss. Fl. Orient. v. 676. Æ cylindrica, C. A. Mey. Verz. Pl. Cauc. 26 (non Linn). Æ. Tauschii, Coss. Notes Crit. 69.

N.W. India, Falconer; Wazuristan, alt. 4500 ft., Stewart.—Distrib. Westward

to Spain and N. Africa.

Stem 6-18 in., erect or geniculately ascending, stiff, leafy. Leaves acuminate, smooth or slightly scalbrid; sheaths smooth, upper subventricose; ligule very short.  $Spike\ 1\frac{1}{2}-5$  in., strict, rachis stout.  $Spike\ 1\frac{1}{2}-\frac{1}{4}$  in., alternating in close succession; gl I and II corraceous, tip truncate often crenulate; fig. gls. hardly longer, truncate or retuse; awns  $\frac{1}{2}-\frac{1}{4}$  in.

DOUBTFUL SPECIES.

T. BENGHALENSE, Host ex Steud. Nom. Ed. II. ii. 715.

ÆGILOPS CILIABIS, Koen. ex Roem. et Sch. Syst. ii. 772 (genus Manisuro proximus) = Rottboellia ciliaris, Willd. ex Steud. l. c. 474 (Ischæmi sp., Trin.).

EG. CORDATA, Linn., Autch Cat. Panjab. Pl. 560

## 129. AGROPYRON, J. Gærtn.

Annual or perennial grasses. Leaves flat or convolute. Spikelets 3-many-fld, solitary, sessile, distichously arranged opposite to hollows in the rachis of a simple spike, with the sides of the glumes opposite the rachis;

rachilla usually jointed between the fl gls. Gl. I and II empty, opposite, (not collateral) narrow, unequal, persistent; fl. gls. rigid, awned or not; nerves 5-7, converging above; keels of palea ciliate. Lodicules entire or ciliate. Stamens 3. Ovary hispid at the top, styles short, distant. Grain narrow, glooved in front, adherent to the palea or not.—Species about 20, in all temp. climates.

The following arrangement and nomenclature of the Indian plants of this most puzzling genus is tentative only, and I cannot render these more worthy of confidence without undertaking a critical study of the whole genus. The characters given under the species must not be regarded as absolute, though founded on careful study of very large series of specimens; for the more of these that are studied, especially if they come from different localities, the more do exceptional characters and connecting forms present themselves. It would hence appear that all the members of the section Eu-agropyrum (perennials with dorsally convex not keeled fl. gls. to which all the Himalayan forms belong) will resolve themselves into a very few widely distributed species A further difficulty is the distinguishing Agropyrum from Elymus, and indeed E sibiricus from A. longe-aristatum, in which two plants the empty glumes are not placed side by side as in Elymus proper; added to which the spikelets are often solitary in E. sibiricus, and I think sometimes aggregated in A. longe aristatum, var Artchisoni. A canenum, Roem. & Sch.; Duthie Grass. N.W. Ind. 44, has according to Duthie's mss been found at Simla, alt. 6500 ft., by Gamble; and by himself in Gangotri, alt. 10-11,000 ft. I have seen no specimens.

### \* Spikelets awned.

1. A. longe-aristatum, Boiss. F7 Orient. i. 660; stems leafy, leaves flat or convolute, spikelets loosely imbricate flattened laterally 6-12-fld, I and II long or short 3-5-nerved, flg. gls. spreading linear-lanceolate 3-5-nerved towards the tip narrowed into a long usually recurved awn 1-1½ in. long. Brachypodium longearistatum, Boiss. Diagn. Ser. I. vij. 127. Griseb. in Goett. Nachr. (1868) 73. Triticum longearistatum, Jaub. & Sp. IU. Pl. Orient. ii. t. 199; Steud. Syn. Gram. 346. T. elymoides, Hochst. ex A. Rich. Tent. Fl. Abyss. ii. 440; Steud. l. c.

TEMPERATE HIMALAYA; from Kashmir to Kumaon, alt. 5500-13,000 ft. EASTERN and WESTERN TIBET, alt. 12-17,000 ft.—DISTRIB Affghan, Persia, Abyssium.

Stem 1-3 ft., stout or slender, erect or ascending from a tufted base. Leaves 6-10 by \$\frac{1}{3}\cdot\text{in}\$, rarely convolute, and sheaths smooth; liqule very short. Spikes 3-5 in., erect or nodding, or horizontal from the decurved top of a very slender peduncle, rarely ovoid and very dense-fid.; rachis slender, smooth; margins of hollows scaberulous or ciliolate. Spikelets sessile, remote or approximate, sometimes crowded and secund, \$\frac{1}{4}\cdot\frac{1}{3}\text{ in. long without the awus, green or blue-purple. Gl. I and II most variable in length, \$\frac{1}{4}\cdot\frac{3}{4}\text{ the length of the lowest fl. gl., elliptic-ovate to narrowly setaceous, awned or not, tap sometimes notched on one side; fig. gls. narrowly lanceolate, smooth or scabrid, narrowed into a usually straight but sometimes recurved stout or slender scabrid awn, prominently 5-nerved above the middle rarely to the base, tip sometimes toothed unilaterally or on both sides of the awn; palea coriaceous, keels ciliolate with erect teeth above the middle. Lodicules hyaline, ciliate. Anthers short. Grain oblong, compressed.—Except by the long awns I am at a loss how to diagnose this variable grass, some states of which approach Elymus sibtricus so closely that I can hardly distinguish them. The following varieties are represented amongst Persian specimens. I do not find that they affect definite localities or elevations in the Himalays.

1. Gl. I and II very short oblong-lanceolate acute or acuminate usually strongly

3-nerved, fl. gls. glabrous or nearly so except towards the tip.

2. Gl I and II as in 1, fl. gl scabild more or less throughout.

- 3 Gl I and II long setaceously lanceolate or lanceolate and long-awned, fl. gls. smooth or scabrid towards the tip
  - 4. Gl I and II as in 3, fl. gls. scabrid more or less throughout.
- 2. A. semicostatum, Nees ex Steud. Syn. Gram. 346; tall, slender, leaves flat, spike elongate, spikelets distant 7-8-fld., gl. I and II linear-lanceolate acuminate smooth or scaberulous strongly 5-7-neived, flg. rather longer erect lanceolate scaberulous above tip entire or 1-2-toothed and narrowed into a straight raiely recurved slender awn twice as long as itself or shorter. Boiss. Fl Orient. v. 662; Duthie Grass. N. W. Intl. 45

TEMPERATE HIMALAYA; from Kashmir to Sikkim, alt. 6-11,000 ft (as low as 3000 ft in the Sutley valley), Thomson, Royle, Jacquemont, &c.—Distrib. Affghan. Turkestan.

Stems 2-3 ft, tufted, erect, or longer, and up to 8 ft., then weak and inclined. Leaves narrow, rarely \( \) in. broad, accuminate, scaberulous or smooth, sheaths smooth; ligule very short. Spikes 3-8 in., rachis scabrid, slender or rather stout. Spikelets 1-2 in. including the awns, green; internodes of rachilla short; gls. scabrid as is the callus of the fi gl; empty gls. always large but very variable in size and nerves, \( \frac{1}{2} \) in. long; flg. gls. erect and appressed, not at all spreading, tip toothed on one or both sides; awn rarely 1 in. long.—As suggested by Boissier this is very closely allied to \( A. \) cannum. In a specimen from Kashmir (\( Duthie, No. 12,651)\) named semicostatum by Hackel, the awns are upwards of an inch long and reflexed as in longe-aristatum, to which it may be referable.

Var. Thomsons, Hook. f.; leaves harry, sheaths villous with reversed hairs.—

Kunawur, alt 11-12,000 ft., Thomson.

3. A. striatum, Nees ex Steud. Syn. Gram 346; tall, robust, leaves flat or involute, spikelets many large imbricating, gls. I and II linear-oblong or oblong-lanceolate as long as gl III acute or obtuse very strongly 7- many-nerved, flg. gls. ovate-lanceolate 5-nerved puberulous or glabrous margins usually ciliate, tip notched or entire, awn straight longer or shorter than the gl. Triticum striatum, Steud. 1.c.

KASHMIR, alt. 8-12,000 ft., Royle, Jacquemont, &c.

Stem 2-4 ft., as thick as a goose's or swan's quill, or more slender. Leaves  $\frac{1}{4}$ - $\frac{2}{3}$  in. broad, scaberulous above. Spike 3-8 in., rachis stout, glabrous with cilcolate margins of the hollows or puberulous. Spikelets  $\frac{1}{2}$ -1 in. long, glumes not spreading; I and II subequal, very corraceous, II  $\frac{1}{5}$ - $\frac{2}{3}$  in. long, deeply channelled when dry; tip sometimes notched or obliquely truncate.—Probably a gigantic form of A. semicostatum or cannum.

4. A. Jacquemontii, Hook. f., dwarf, leaves filiform flexuous, sheaths hyaline silvery, spikelets 2-5 cuneately obovate, glumes spreading, I and II small lanceolate acuminate, II 3-nerved awned, fl. gls. lanceolate smooth 5-nerved above the middle narrowed into a slender recurved awn many times longer than itself. Bromus tataricus, Jacquem. mss.

WESTERN TIBET; Bekar, Jacquemont; Nubra, alt. 17,000 ft., Thomson; plain N. of Kumaon, alt, 15,500 ft., Strackey & Winterbottom; Chimoreri, Stoluczka.

Stems 6-12 in., erect or ascending, densely tufted, thickened at the base and clothed with short shining sheaths. Leaves 1-3 in., convolute, glabrous, tip obtuse. Spilelets subterminal, close together, ½-½ in. long without the awns, 4-6-fld.; rachilla smooth; gls. I and II ½-½ in., margins hyaline, nerves very prominent; fig. with the outer pair of nerves marginal and produced to the base, the inner pair rarely reaching below the middle, tip sometimes 2-toothed; awn sometimes strongly recuived, rarely straight; palea obtuse, keels ciliolate. Anthers very small.—I vol. VII.

should have taken Jacquemont's mss. specific name for this species, had it not been that it was taken up by Munro for another plant. (See Elymus sibiricus.)

5. A. Thomsoni, Hook. f.; lower sheaths villous, spikelets many ovoid erect, glumes electo-patent, I and II ovate-oblong acute or acuminate 5-7-nerved margins hyaline, fig. gls silkily villous ovatelanceolate narrowed into an erect slender awn twice as long as the gl or shorter.

WESTERN HIMALAYA, alt. 10-12,000 ft., from Kunawur and Piti, Jacquemont,

Thomson, to Garwhal, Strackey & Winterbottom, Duthie.

Stem 2-3 ft, stout or slender, densely tufted. Leaves narrow, margins flat or involute, upper glabious, lower more or less harry. Spikes 3-6 in, rachis pubescent on the margins or all over. Spikelets  $\frac{1}{2} - \frac{2}{3}$  in. without the awns, 5-7-fld.; internodes of rachilla short, scaberulous; gls. I and II with scaberulous nerves; II sometimes toothed at the tip and mucronate; fig. gls. faintly nerved; keels of palea ciliate.

- \*\* Spikelets awnless (or very shortly awned in Indian specimens).
- 6. A. repens, Beauv. Agrost. 102 (the Indian form); stem very slender, leaves narrow, spike slender, spikelets rather distant 5-6-fld. oblong quite glabrous, gls. I and II unequal linear or linear oblong obtuse acute or notched at the tip strongly 3-5-nerved margins scarious, II much shorter than III, fig. gls. linear obtuse or obliquely retuse or notched strongly 3-5-nerved in the upper half. Reichb. Ic. Fl. Germ. i. t. 20; T. Nees Ic. Fl. Germ. Monocot. 1. n. 80; Steud. Syn. Gram. 343; Rom. & Sch. Syst. ii. 751; Reichb. l. c t. 22 Triticum repens, Linn Sp. Pl. 86; Fl Dan t 748; Host Gram Austr. ii. 27, t 21; Engl. Bot t 909, Knapp Gram. Britt. t. 111, Kunth Enum. Pl. 1. 440, Suppl. 361.

KASHMIR, alt. 9-12,000 ft, Duthie. WESTERN TIBET; Gilgit. alt. 8 00 ft.,

Giles; Ladak, Zanskar and Karakoram, alt 8-14,000 ft., Thomson, &c.

- Stems 1-2 ft., densely tutted at the base, erect or ascending. Leaves flat, or convolute when dry,  $\frac{1}{12} - \frac{1}{8}$  in. broad, smooth, glabrous or puberulous above Spiles 3-6 in., erect, rachis slender, margins of hollows quite glabious. Spikelets \(\frac{1}{2}-\frac{2}{3}\) in., very pale, internodes of rachilla short nearly glabrous; glumes rather spreading, calli quite glabrous; keels of palea smooth.—I follow Munro, Clarke and Hackel (in litt) in referring this species to A. repens, though it differs much from Boissier's description of that species in the leaves not being scabild, in the unequal glumes, of which I and II are much shorter than the fig. and in the latter not being lanceolate.
- 7. A. dentatum, Hook f.; root creeping, leaves flat, spike slender, spikelets imbricating 3-5-fld. quite glabrous or sparsely pubescent, gls. I and II large subequal oblong obtuse obliquely truncate unidentate or mucronate rarely awned very strongly 7-9-nerved, fl. gls. linear-oblong obtuse acute or acuminate strongly 5-nerved above the middle.

KASHMIR, alt. 9-12,000 ft., Jacquemont, Thomson, &c. WESTERN TIBET.

Karakoram, alt. 14,000 ft., Clarke.

Habit of A. repens, to which specimens have been referred by Munro and Clarke, but the spikelets (which are green or purplish) are closely imbricating, the margins of the hollows of the rachis scaberulous or ciliolate, the empty gl. much larger broader and as long as the fig. or nearly so and many-nerved —Under No. 12,432 of Duthie's Kashmir collections I find along with typical A. dentatum, and

apparently from the same plant, a specimen with scaberulous leaves and sheaths, ovate-lanceolate acuminate shortly awned 3-5-nerved empty gls. and fewer

pubescent acuminate shortly awned fig. gls.

Var. ?elatum, Hook. f.; stem 3-4 ft. stout, leaves ½ in. broad, empty gl. ½-½ in. long ovate-lanceolate acuminate shortly awned entire or notched on one side 5-7-nerved, fl. gls. narrowed into a short awn.—Kashmir; Dras, alt. 12-13,000 ft., Thomson.—Perhaps this had better be referred to semicostatum or striatum. It was placed in repens by Munro.

### 130 HORDEUM, Linn.

Erect annual, rarely perennial grasses. Leaves flat. Spikelets 1-fld., 2-3-nate in the hollows or at the nodes of a simple cylindric spike, the lateral often imperfect; rachilla jointed at the base of the fl gl. and produced above it with sometimes an imperfect gl. Glumes I and II empty, very narrow, rigid, persistent, the outer of each cluster of spikelets often together resembling an involucre; III dorsally rounded, 5-nerved above, narrowed into an erect or recurved awn; palea 2-keeled. Lodicules 2, ciliate. Stamens 3. Styles very short. Grain grooved in front, tip usually villous, adherent to the palea or free.—Species about 12, natives of temperate regions.

### \* 1nnuals.

H. VULGARE, Linn. Sp. Pl 84; spikelets 2-6-ranked, fl. gl. long-awned. Beauv. Agrost. 114, t. 21, f 1; Host Gram Austr. in. 23, t. 34; T. Nees Gen Fl. Germ. Monocot 1 n. 83; Steud. Syn. Gram. 357; Duthie Grass N.W Ind. 45, Fodd Grass. N. Ind. 69, t. F. f. 32; Nees Agrost. Bras. 455; Wall. Cat. n. 3789; Hack. in Engl. & Prantl Pflanzenfam 11. 80; Kvern. & Wern. Handb. der Getreideb. 11. 600. H. sativum, Pers. Syn. 1. 108. H. coeleste, Viborg, Wight Cat. n. 1772.

Cultivated, chiefly in N. INDIA and up to 13,000 ft. in the Himalaya.

Var. hexastichon, Aitchis. Cat. Panjab. Pl. 171; spikelets 6-ranked, H. hexastichon Linn. Sp. Pl. 85; Beauv. l. c. 114 (hexastachyon); Kunth l. c. 455, Suppl. 368; Host l. c. iii. 24, t. 35; Gartn. Carp. ii. 10, t. 81, f. 3; Roxb. Fl. Ind. i. 358; Grah. Cat. Bomb. Pl. 234; Dalz. & Gibs. Bomb. Fl. Suppl 96; Nees Agrost. Bras. 455; Steud. l. c.

Var. distiction; spikelets 2-ranked. H. distiction, Linn. l. c. 85, Host l. c. 85, t. 36; Kunth l. c i. 455, Suppl. 369, t. 37; Gærtn. Carp. ii. 10, t. 81, f. 3; Ledeb. Fl. Ross iv. 327; Nees Agrost. Bras. 454; Steud. l. c. 351. Zeociiton disticum,

Beauv. Agrost. 115 .- Quetta, Stocks (cult).

Ver. Ægiceras, Aitchis. Cat. Panjab Pl. 171; spikelets 2-ranked, gl. III produced into a chlated 3-fid appendage with the lateral lobes deflexed. H. Aegicer.s, Royle Ill. Bot Himal. 418, t. 97; Henslow in Hook. Kew Journ. i. (1849) t. 2, 3; Schlecht. in Bot. Zest. (1847) 768; Lindl. Nat. Syst. Bot. Ed. II 372. H. coeleste var. triturcatum, Hort. Monsp.; Schlecht. in Linnaa, xi. (1837) 543; Ser. in Ann. Sc. Phys. & Nat. Soc. Agric. Lyon. iv. ex Bot Zest. (1817) 768. H. heterostachyum, Beauv. Agrost. 114. H. himalayense, var trifurcatum, Hort. Monsp.; ex Irmisch in Linnaa, xii. (1839) 124, t. 4; Steud. l. c. 252. H. nepalense, Sweet Hort. Brit. Ed. I. 444. H. trifurcatum, Fisch. & Mey. Ind. Sem. Hort. Petrop. fisc. 3 (1837) 131; Wender. in Flora (1843) 233. H. vulgare, var. cornutum, Schrad. in Linnaa, xi. (1838) 471. H. vulgare, var. trifurcatum, Koern. & Wern. l. c. i. 170, t. 3, f. 26. Citho Aegiceras, E. Mey. Ind. Sem. Hort. Regiom. 1848, 5; in Ann. Sc. Nat. Ser. III. xi (1849) 253; Linnaa, xxiv. (1851) 195. Triticum lordeiforme, Wall. ex Steud. Nomencl. Ed. II. ii. 716.—Thibet Barley, Hock. Lond. Journ.

Bot. vii. (1813) 215.—Temp. and Alp. Himalaya, from Kashmir to Sıkkim, Tibet and China.

Var mudum; spikelets 2-ranked, grain free within the palea. H nudum, Arduini in Schult. Mant. ii 437. H gymnodistichum, Watt Diet. Econ. Prod. Ind. iv. 274. H. distichum, B. Kunth l. c. i 455; Kew Bullet. (1888) 271. H. coeleste, Koern. et Wern l. c. i. 166, ii. 629. PH himalayense, Rittig Beschr. Hanal. Gerste (1822), ex Schult. Mant. ii. 481.—Cult up to 14,000 ft. with brown or often purplish spikes.

1. **H. spontaneum**, C Koch in Linnæa, xxi (1848) 430; tall, densely tufted, leaves flat finely acuminate, spike narrow tachis fragile, spikelets 2-ranked lateral stipitate male awnless, flg. gl. lanceolate plumosely ciliate, awn very long flattened. Steud. Syn Gram. 351 H. thaburense, Boiss Diagn. Ser. I xiii. 20; Fl. Orient v 687, Aitchis. in Trans. Linn. Soc. Scr. II. ni 127 H. Decaisneanum, Hort.

BRITISH BELUCHISTAN; Quetta, Stocks .- DISTRIB. Westwd. to Palestine.

Stems forming great clumps 3 ft. high, resembling cultivated barley, Astchis. L. c. Leaves flaccid, narrowed into very long points; ligule short Spiles  $1\frac{1}{2}$ -3 in. Spikelets  $\frac{1}{2}$  in, pedicel flat with villous margins; gls. linear-oblong. Awn 4-8 in. —The only truly wild Barley of the cultivated type, most nearly allied to vulgare var. distuction, but differing in the villous spikelets and jointed fragile spike. Grisebach, however (in Ledeb Fl. Ross iv. 317) says under the cultivated H. distuction, that he has found the spike to be fragile in some of its forms.

2. **H. murinum**, Linn. Sp. Pl. 85; stems ascending leafy, spike stout subcylindre fragile dense-fid, spikelets 3-nate lateral male or neuter, fl. gl. lanceolate awned ciliate below or glabrous. Fl. Dan. t. 629; Host Gram. Austr 1.25, t. 32, Engl. Bot. t. 1971; Knapp Gram. Britt. 104; Reichb. Ic Fl. Germ. t. xi., T. Nees Gen. Fl. Germ. Monorot. in. 83; Kunth Enum. Pl. 1. 456, Suppl. 370, Ledeb. Fl. Ross. 1v. 328; Boiss. Fl. Orient. v. 686; Benth. Fl. Austral. vii. 669; Nees Agrost. Bras. 453, Fl. Afr. Austral. 363; Steud. Syn. Gram. 352, Duthie Grass. N.W. Ind. 45. H leporinum; Link in Linnea, iv. (1835) 133. H. vaginatum, C. Koch in Linnea xxi. (1848) 433; Steud. l. c. Triticum murale, Salisb. Prodr. 27. Zeocriton murinum, Beauv. 1grost 125.

KASHMIE, alt. 5-6000 ft., Jacquemont, &c. Peshawue, Stewart.—Distrib. Westwd. to the Atlantic.

Stem 6-18 in., ascending from an often decumbent base. Leaves flat, glabrous or sparsely puberulous and scaberulous; sheaths inflated; liquide small, scarious. Spikes 1-2; by  $\frac{1}{2}-\frac{2}{3}$  in., inclined, green. Spikets with the awns 1 in.; empty gl. filiform; flg. gl. flattened, much shorter than the straight awn; keels of palea cihate.

### \*\* Perennials.

3. **H. secalinum**, Schreb. Spicil. Fl. Lips. 148; stem elect leafy, spike narrow subcylindric dense-fld, spikelets 3-nate lateral male or neuter. Host Gram. Austr. 1. 26, t. 33, Trin. Sp. Gram. Ic. t. 3 & 4; Benth. Fl. Austral. vii. 669; Boiss. Fl. Orient v. 687. H. pratense, Huds. Fl. Angl. Ed. II. 56; Engl. Bot. t. 409, Trin. l.c. t. 4; Knapp Gram. Britt. t. 105; Reichb Ic. Fl. Germ. i. t. xi; Ledeb. Fl. Ross. iv. 328; Steud. Son. Gram. 352; Duthie Grass. N.W. Ind. 45. H. nodosum, Linn. Sp. Pl. Ed. II. 126 (excl. Syn. Ray.). H. brevisubulatum, Link in Linnea, xvii. (1843) 391. H. maritimum, Roth Tent. Fl. Germ. II. i. 150; Fl. Dan. t. 630. Zeocriton secalinum, Beauv. Agrost. 115.

KASHMIE & ISKARDO, alt. 7700 ft., Clarke, Duthie. WESTERN TIBET, alt. 10-15,000 ft., Thomson. Shibchilam (N. of Kumaon) alt. 15,000 ft., Strackey & Winterbottom.—Disteib. Europe, N. Asia, temp. N. & S. America.

Stems densely tufted, 3-6 in, stout or slender, often geniculate at the base. Lean es short, linear, flat, glabrous or harry beneath; ligule small. Spikes 2-3½ by  $\frac{1}{6}-\frac{1}{3}$  in, erect or inclined, rachis subfragile, green or purplish. Spikeslets densely crowded, sub hexastichous,  $\frac{1}{6}-\frac{1}{3}$  in, long, awas longer or shorter than the gl.—Some of Dr. Thomson's Tibetan specimens are upwards of 3 ft. high with the stem nearly as thick as a goose-quill.

### 131 ELYMUS, Lunn

Characters of Agropyrum, but spikelets for the most part in pairs, threes, or fascicled in the nodes of the rachis, and empty gls. usually more or less collateral—Species about 20 enumerated, of N. and S. temperate regions.

Bossier (Fl. Or. v. 690) consider Elymus as too closely allied to Hordeum. To me it appears to be connected with Agropyium through E. sibirious, and A. longearistatium, in both which the empty gluines are opposite one another, not as in the other Indian Elymus placed more or less collaterally. It is as difficult to limit the species in one genus as in the other, and the more specimens one has of any species, the more difficult it is to limit it.

\* Aun of fl gl much longer than the gl.

1. E. sibiricus, Linn. Sp. Pl. 3, spike short or elongate and flexuous, spikelets geminate and fascicled, empty gls subopposite much shorter than the 5-7-fld. spikelet, fl gls. lanceolate 5-nerved narrowed into a slender erect or recurred awn much longer than the gl Schreb. Gram. i. t 21, f. 1, Kunth Enum. Pl. i. 451, Suppl. 367, Ledeb Fl. Ross. iv. 330; Steud. Syn Gram 348, Duthie Grass. N. W. Ind. 46. E. glaucus, Burkl. in Proc. Acad Sc. Philad 1862, 99. E nutans, Griseb in Goett. Nachr. (1868) 72 E tener, Linn. f Suppl. 114.

TEMPERATE & ALPINE HIMALAYA; from Kashmir to Sikkim, alt. 10-14,000 ft. EASTEHN & WESTERN TIBET, alt. 10-15,000 ft. (15-18,000 ft., Stoliczka).—DISTEIB.

Affghan., Abyssinia, N. Asia & America.

Stem 1-2 ft., densely tufted, ascending, smooth, erect inclined or decurved below the spike. Leaves  $\frac{1}{6} - \frac{1}{3}$  in. broad, nearly smooth, ligule very short Spike very variable, 4-10 in. long, green or brownish, straight curved or flexuous, rachis smooth, or faintly scabilid, as are the margins of its hollows. Spikelets 1-1 in. long excluding the awns, sessile and pedicelled; rachilla slender, minutely scaberulous, its internodes long or short; gl. I and II most variable, II 1-2 the length of the lowest fl. gl, from narrowly oblong to ovate-oblong lanceolate or almost setaceous, acute acuminate or both or II only awned, quite entire (never notched), usually strongly 3-nerved; fl. gls. narrowly lanceolate, narrowed into the awn, quite entire or tip toothed on one or both sides at the base of the awn, glabrous smooth or faintly scaberulous, 5-nerved usually to the base; awn 3-1 in.; palea linear, keels ciliate-toothed above the middle. Lodicules lacerate. Anthers short. Orary pyritorm, top hirsute; stigmas short —A very abundant grass in Tibet and the higher Himalaya, states of which are with difficulty distinguished from Agropyrum longe-aristatum (which see), and just as variable, in the empty glumes especially, but the awns are usually shorter. A small very slender form with an inclined horizontal and upcurved spike of secund purplish spikelets is var. minor of Hackel (Duthien 13,745) and Agropyrum longe-aristatum var. Aitchison of Boiss (Fl. Or. v. 660) and Brachypodium tataricum, Munro in Journ. Linn. Soc. xvii. (1881) 109 .--Another variety (Bromus dubius, Jacquem. mss.) has oblong very dense short subcylindric spikes. It is a very alpine form, found at 15-18,000 ft. elevation in Eastern and Western Tibet.

2. **E.** dahuricus, Twrc. in Bull. Soc. Nat. Mosc. (1838) 105, et xxix. I. (1867) 62; spike narrow strict or subflexuous, spikelets geminate 2-3-fid, empty gls. collateral linear-lanceolate acuminate or subaristate 5-7-nerved nearly as long as the spikelet, fl. gls. lanceolate scaberulous 5-nerved narrowed into a slender erect awn as long or twice as long as the gl. ?Hordeum sylvaticum, Duthie Grass, N.W. Ind. 45.

Kashmir, Falconer, &c; Iskardo, Clarke, alt. 7500 ft.; Sind Valley, 6000 ft., Gammee. Western Tibet, alt. 11-14,000 ft., Thomson-Distrib. N. Asia

Stem 2-3 ft., rather stout and leafy, or shorter more slender and leafy at the base chiefly. Leaves 3-3 by  $\frac{1}{6}$ - $\frac{1}{6}$  in., flat, finely accuminate, nearly smooth or scaberulous above, sheaths smooth; ligule very short. Spike 3-8 in., rachis glabrous or nodes pubescent Spikelets  $\frac{1}{3}$ - $\frac{1}{2}$  in. exclusive of the awns, green, imbricating; gl. I and II subequal, strongly 3-5-nerved, smooth or scaberulous, rarely toothed on one side towards the tip; fl. gls. lanceolate, more or less distinctly notched at the tip, 5-nerved, from nearly glabrous to scaberulous, and with minutely ciliolate nerves; awn  $\frac{1}{3}$ - $\frac{1}{2}$  in.; keels of obtuse palea strongly shortly ciliate. Gram oblong, dorsally compressed, concavo-convex, tip villous.

Var. p more robust, spike stouter, spikelets large, \(\frac{1}{2}-\frac{2}{3}\) in., more crowded, 3-5-fid.,

awns of fl. gl. 1-2 in .- Karakoram, alt. 12,000 ft. Clarke.

\*\* Awn of fl. gl much shorter than the gl I

3. E. dasystachys, Trin. in Ledeb. Fl. Alt. i 120, Fl. Ross. iv. 333, Ic. t. 249; spike stout strict, spikelets geminate 2-5-fld, empty gls. collateral unequal subulate-lanceolate 1-3-nerved aristately acuminate, II nearly as long as the lowest fl. gl, fl. gls. lanceolate more or less silky 5-nerved tip notched towards the subulate or shortly awned tip. Steud Syn. Gram 350; Duthie Grass. N.W. Ind. 46. E jenisseensis, Turc. in Bull. Soc. Nat Mosc. xxix. (1856) 1. 64.

KASHMIB & KUNAWUR, alt. 8-12,000 ft., Jacquemont, Clarke, &c. Western Tibet, alt. 10-14,000 ft., Thomson, &c. Luptal (N. of Kumaon) alt. 14,500 ft.,

Strachey & Winterbottom.—DISTRIB. Turkestan, Siberia.

Stem 2-5 ft., stout or slender. Leaves 6-12 in., flat and  $\frac{1}{6}-\frac{1}{3}$  in. broad, or narrow with margins involute, smooth or scaberulous. Spike 6-8 in., variable in breadth; rachis stout, pubescent sparsely villous or nearly glabrous. Spikelets  $\frac{1}{3}$  in. long; gl. I and II very narrow, 1- larely 3-nerved; fl. gls. notched at the base of the awn on both sides, 5-nerved, rarely almost glabrous; keels of obtuse palea stoutly ciliate.

4. **E.? Thomsoni,** Hook. f.; spike stout strict, spikelets 2-3-nate densely crowded sessile and pedicelled, glumes all scarious (in frt.) broadly oblong or ovate-oblong with hyaline margins or very stout midrib and 7-9 fainter lateral nerves suddenly ending in a short stout awn.

WESTERN TIBET; Danskar, in Piti, alt. 13,000 ft., Thomson.

Stem 12-14 in., very stout, erect. Leares 3-6 in, harrow, convolute, coriaceous, smooth, finely acuminate, subpungent; sheaths broad, striate; ligule very short. Spike 3-4 in., rachs very stout, smooth or subsilky on the angles. Spikelets \frac{1}{3}-\frac{1}{2}\] in., glabrous or faintly pubescent; rachilla very short and stout; glumes subpubescent, usually broadly notched below the awn often unequally, margus ciholate, 7-9-nerved; palea very broad, pubescent, ciliate, 2-lobed, keels unequal more or less ciliate. Grain free, concavo-convex, top glabrous.—I have seen only two specimens of this plant, which resembles a wheat more than an Elymus, from which latter genus it differs in the free grain with a glabrous tip; both specimens are far advanced, and I doubt the grain being in a normal condition.

### 131.1 ASPERELLA, Humb.

(Not in Clavis, p. 9.)

Tall perennial grasses. Leaves narrow, flat. Spikelets 1- or more-fld., 2-3-nate opposite hollows in the rachis of a terminal elongate simple slender spike, with the sides of the glumes opposite the rachis; rachilla jointed under the fig. gls. Glumes I and II 0, or in the lowest spikelets minute, subulate; fig. gls. rigid, lanceolate, convolute, narrowed into an awn, dorsally rounded, 5-nerved above the middle; palea 2-keeled. Lodicules 2, obovate or dimidiate-obovate, hairy. Styles very short, free, sigmas plumose. Grain narrowly oblong, ventrally grooved, adherent to the palea, tip villous.—Species 5, 1 Siberian, 2 American, 1 N. Zealand, and the following.

A. Duthiei, Stapf in Hook. Ic. Pl. ined. f.; spikelets 1-fid., rachilla produced.

WESTERN HIMALAYA; Tibri-Garwhal; alt. 7-8000 ft., Duthre.-DISTRIB. China.

Stem 3 ft, glabrous. Leaves 10 by 3 in lanceolate, setaceously acuminate, thinly membranous, scabrid on both surfaces; sheaths elongate, nodes thinly villous; ligule truncate, minutely cilcolate. Spike 6 in., very slender, rachis pubescent. Spikelets \(\frac{1}{3} - \frac{1}{2}\) in long, nearly all 2-nate, pale; rachilla glabrous terminated by an awn; fig. gl. lanceolate, 7-nerved, narrowed into an awn almost twice as long as itself, nerves rough; palea about as long as the gl. Lodicules obovate, hairy.—Allied to A. Hystrix, Willd., and to A. sibirica, Trautv. differing from both in the 1-fid. spikelets. Foliage as in A. Hystrix, but spike not at all stiff. A. sibirica has narrower firmer leaves, more markedly nerved gls., and much shorter awns.—Stapf.

## Tribe XI. BAMBUSEÆ. (See p. 91.)

# By J. S. Gamble, M.A., F.L.S., Conservator of Forests, N.-W. Provs.

The following account of the Indian Bambuseæ is drawn up, almost verbatim, from Mr. Gamble's "Bamboos of British India," which forms part of vol. vii. of Dr. King's "Annals of the Royal Botanic Gardens of Calcutta," and of which Dr. King favoured me with a copy in advance, together with his and Mr. Gamble's permission to reproduce its contents in a form suited to the "Flora of British India." In doing this I have been obliged to curtail the descriptions. And in order to preserve the arrangement of matter adopted in this work, I have had to substitute for the Keys to the species employed by Mr. Gamble, specific characters selected according to my judgment from his detailed descriptions; and in a few cases to substitute synonymous technical terms for those he has used. I have added nothing; for it is obvious that a botanist of Mr. Gamble's ability and wide experience of so many of the Indian Bamboos in their native forests, having access also to the unrivalled collections in the Herbarium of the Calcutta Gardens, should have exhausted the subject in so far as materials were available. It must not be supposed that this work supersedes his "Bamboos of British India," which is indispensable to the student of the tribe, by reason of its fuller descriptions, and admirable plates and analyses. My cordial thanks are directly due to Dr. King and Mr. Gamble for this generous contribution to the "Flora of British India," and indirectly for the authentically named collection of specimens corresponding to Mr. Gamble's descriptions, which has been presented by the Government of India to the Herbarium of the Royal Gardens, Kew.

Since the above was written, Mr. Freeman Mitford's "The Bamboo Garden" has appeared, a work replete with valuable observations upon the habit, mode of growth, and other characters of the hardy species of Bamboo (including 5 Indian) cultivated by him. In it is pointed out (see Arundinaria Simoni, p. 60) for the

first time the true characters of the two types of sheath and blade that occur in Bambusce, and which do not obtain, so far as I know, in any other tribe of grasses. In a communication which Mr. Mitford has been good enough to make to me on this subject, he has formulated his views as follows, and has kindly allowed me to introduce them here.

"The sheath is an organ playing so important a part in the life of the Bamboo that it deserves something more than a cursory notice. In the grasses generally the sheath is regarded by botanists as taking the place of the petiols of the leaf. It happens, however, that the leaves of most Bamboos—indeed of all the hardy Bamboos -have a distinct continuation of the midrib of the leaf ittaching it to the sheath and articulated, which continuation might perhaps be correctly termed a petiolule. The Bamboos, as it appears, bear sheaths of two types. There is first of all the series of sheaths which, borne one on each node and wrapped tightly round the culm or branch, as the case may be, protect it during growth. This form of sheath is divided or split transversely into two members, the ligule and the limbus or blade, the latter being what I would term a pseudophyll, or false leaf, sessile, lacking both midib and petiole, varying in size in the different species, but always the first part to wither and disappear In some Bamboos-those of the Phyllostachys groupthis sheath falls away as soon as branching takes place, in others, of the Arundinana group, it remains, and having guarded the tender growth of the parent culm or branch it springs aside with the young branches or branchlets, devoting the remainder of its life to their protection until they can stand alone

"Then there is the second form of sheath bearing a true leaf with petiole and midrib. This is the form a samed by the two, three, or four sheaths at the top of each culm branch and branchlet above the topmost node where branching ends. This true leaf is persistent upon the sheath. The ligule is present, as in the flist

type, but the deciduous pseudophyll is replaced by an evergreen leaf.

"An interesting question arises as to whether there is any transition stage between the two types of blade, or whether the change is always sudden. I think that in many Bamboos I can trace such a transition stage; that is to say, that each successive pseudophyll on the stem becomes more and more like a true leaf, something of the nature of an arrested midrib being perceptible in the pseudophylls which are found near the top of the culm, though it is not until the last branching node has been passed that the true leaf-bearing sheaths occur. The principle remains inviolate (throughout the hardy species at any rate), and the distinction between the two classes of sheaths is absolutely maintained."—A B. F. M.

I would remark in conclusion that Mr. Mitford's observations, extending to the nervation of the leaves of Bamboos, lead him to the conclusion that of those cultivated by him in the open air in the middle of England, the truly hardy only have tessellated leaves; the tender, such as Arandonaria Falconeri and falcata, having very incon-

spicuous transverse nervules, or none.-J. D. H.

## Subtribe I. ARUNDINARIE.E. (See p 91.)

## 132. ARUNDINARIA, Miche.

Erect or climbing shrubs. Stems slender, nodes usually prominent, internodes rather short, branches short fascicled. Stem-sheaths papery, straw-colrd., blade subulate. Leaves usually small, jointed on the sheath. Infl. on separate stems, or terminal, or on leafing branches. Spikelets 1- many-fld., compressed, usually all bisexual, except sometimes the terminal. often sheathed, empty gls. 2, unequal, membranous; flg. gls. longer, obtuse acute or mucronate, many-nerved, palea 2-keeled. Lodicules 3. ciliate. Stamens 3, raiely up to 6 Ovary globose above; style short, stymas 2-3 plumose. Grain ovoid or narrowly oblong, dorsally turrowed, included in the gl. and palea—Species about 50, 14 American, 1 African, the rest Asiatic.

A. Species of which the flowers are known.

- Sect. 1. Erect shrubs; infl. on leafy branches; bracts of infl. small. Stamens 3.
  - \* Nodes of stem not spinous. See also A. Pantlingi.
  - † Spikelets many, in large terminal panicles.
- 1 A. Walkeriana, Munro in Trans Linn. Soc. xxvi. (1868) 21; leaves shortly stoutly petioled thick elliptic to oblong-lanceolate pungent acuminate tessellate base rounded margins cartilaginous recuived spinuloseserrate. Bedd. Fl Sylv, Forest. Man. p ccxxx., Gamble Bamb. Brit. Ind. 3, t. 1; Trim. Cat. Ceyl Pl. 110.

TRAVANCORE; Pulney Hills, Beddome. CEYLON; Walker. Thwaites.

Stems 1 in diam., thickly clothed above with sheaths of fallen leaves, internodes about 15 in. Leaves 5-11 by 1-1; in, base cucullate, midrib nariow, nerves 6-10 pairs; sheath glabrous, mouth truncate crliate, margin with curved bristles; ligule short. Paniele 6-12 in, red-purple, branchlets fillform, lower axils glandular and upper sparsely harry. Spikelets up to 1 in when mature, nariow, glabrous, 3-4-fild.; rachilla flattened, ciliate, gl. I and II subequal  $\frac{1}{10}$ -1 in., I usually 3-nerved, II, 5-or more-nerved, apiculate, ciliate; fig. gls. larger, with 2 prominent nerves and intermediate fluer ones; keels of palea ciliate.—Probably flowers frequently.

2 A. Wightiana, Nees in Linnau, ix. (1834) 482, shrubby, slender, leaves thin shortly petioled long-acuminate tessellate base rounded or nairowed margins incurved scabrid, spikelets 3-5-fid. in dense leafy spieading panicles long-pedicelled, fl. gls. obtuse. Rupr. Bamb 26, t. 3, t. 10, Munro in Trans Linn Soc. xxvi. (1868) 19; Bedd. Fl. Sylv., Forest. Man. p ccxxx, Aual. Gen t 28; Brandis For. Fl. 563; Steud. Syn. Gram. 335, Thw. Enum. Pl. Zeyl 444; Gamble Bamb. Brit Ind 4, t. 2

MALABAR & TRAVANCOR, alt 6-8600 ft., Wight, &c. Chilon, Pediotallagalla,

alt 8000 it., Thwaites (CP. 3860)

Gregarious, rhizomes branching. Stems 6-10 ft, or higher; nodes swollen, girt with a harry ring; internodes 10-14 in., usually flattened on one side and rough, young strongly striate; branchlets whorled. Stem-sheaths 4-8 by 1-3 in., narrowed slightly upwards, base hispid with golden tubercle-based hairs, limb 1-1½ in., subulate, scabrid Leoves 5-7 by ½-1 in., glabrous above, glaucescent beneath, midrib usually glaudular-pubescent, nerves 5-7 pairs, sheaths striate, keeled, often purple, sometimes hispid with tubercle-based hairs, mouth 5-3-setose, margins ciliate; ligule short, obtise. Spikelets 3-5-fid., purple, glabrous or scabridly hirsute; gls. I and II ovate, acute, I 5- II 7-nerved; fl. gls ovate, 9-11-nerved, mucronate, scabrously hispid, palea 2-caspidate, 3-nerved and transversely nervuled, keels ciliate.—Flowers annually.

Var. β. hispida, Gamble l. c; leaf-sheaths and stems thickly clothed with tubercle-based golden hairs, internodes more flattened on one side. A. hispida,

Steud. l c. A moliniformis, Hochst. in Herb. Hohenach n. 1282.

3. A. floribunda, Thw Enum. Pl Zeyl. 375; internodes retrorsely hirsute, leaves thin lanceolate acuminate spinulose-serrate tessellate narrowed into a very short 2-glandular petiole, spikelets 5-8-fld. minutely silkily pubescent, fl. gls acuminate. Munro in Trans. Linn. Soc. xxvi. (1863) 20; Beddome Fl Sylv., Forest. Man p. ccxxx.; Trim. Cat. Ceyl. Pl. 110; Gamble Bamb. Brit. Ind. 6, t. 3.

CEYLON; Maturatte district, alt 5000 ft., Thwartes (CP. n 2624)

Stems 2-5 ft, erect; internodes 2-4 m. Leaves glabrous, primary nerves 3-4 pairs; sheath sometimes hispid with tubercle-based hairs, ending in a ciliate mem-

brane below the petiole and short auricles with 5-8 twisted bristles; ligule short. Panicle large, with slender filiform branches appressed at first, axils glandular. Spikelets about 1 in., gl. I 10-3 in., acute, 3-nerved, tip ciliate; II longer, more nerved; fl. gls. 3 in., acuminate, 7-9-nerved, tip ciliate; keels of palea ciliate; grain 1 in., red.

- †† Spikelets few, in short panieles.
- 4. A. elegans, Kurz in Journ. As Soc Beng. xlii (1873) 248; For. Fl. Burma, in 549; stems slender, internoles smooth, leaves linear-lanceolate long acuminate tessellately nerved, margins cartilaginous scabrid, spikelets long 7-8-fid in a terminal interrupted panicle or raceme pedicelled flattened, fl gls distant acuminate. Gamble Bamb. Brit. Ind. 6, t. 4.

UPPER ASSAM; Naga Hills, alt. 5500 ft, Rollo BURMA, Poneshee, J. Anderson;

Tenasserim and Martaban, alt. 5-7500 ft., Kurz, &c.

Stems 12-20 ft. high by  $\frac{1}{10-10}$  in. diam.; internodes 7-9 in, flattened on one side, smooth; sheaths  $\frac{1}{3}$  the length of the internodes, papery, hispidulous, upper  $\frac{1}{3}$  narrowed to a truncate minutely auricled mouth; blade subulate, recurved. Leaves 4-5 by  $\frac{1}{10}-\frac{1}{2}$  in., have narrowed into a very short petiole, midrib yellow, primary nerves 4-6 pairs; sheath smooth, striate, tipped with a clinte callus, auricles bristly; ligule very short. Spikelets 1 in. or more; gl I and II  $\frac{1}{3}$  in, ovate, acuminate, 3-5-nerved, keel clinate; fl gls. similar, 7-nerved and transversely nervuled; palea obovate, 2-fid, 2-nerved between the white-clinate keels and 1-nerved on each side of them.

5. A. polystachya, Kurz ee Gamble Bamb Brit Ind. 7, t. 5; stems soft, leaves thin soft lanceolate acuminate with a twisted tip, rough above white barry or smooth beneath not or rarely tessellately nerved margins scabrous ligule long, spikelets long 4-6-fid. in a large terminal or axillary racemose leafy panicle with papery bracts, fl. gls. distant ovate long-acuminate.

SIKKIM HIMALAYA & the Khasia Hills, alt. 3-5000 ft., Griffith, Kurz, Mann, &c.

- A small shrubby bamboo; stem-sheaths unknown. Leaves 6-8 by  $\frac{7}{10}$ -1 in, base rounded or narrowed, petiole very short, midib rather broad, principal nerves 5 pairs, with lines of pellucid glands between the secondary, transverse nervules few or 0; sheath greenish yellow, striate, glabrous, ending in a broad 2-fid callus, and produced upwards to meet the long striate obtuse fimbriate hgule. Spikelets  $\frac{1}{2}$ - $\frac{7}{10}$  in., rachilla clavate; gls. I and II ovate, acuminate, 5-7-nerved, keeled and ciliate above; fi. gls. about twice as long, 7-9-nerved, ciliate; palea longer, mucronate, tip 2-fid, 1-nerved between and 1-nerved on each side of the ciliate keels.
- 6. A. debilis, Thw. Enum. Pl. Zeyl. 375; shrubby, stems much branched, leaves small linear-lanceolate acute obscurely or not tessellate tip scabrous base acute or subtruncate, ligule short, spikelets short 3-fld., shortly pedicelled in a terminal short leafy panicle, fl. gls. imbricating ovate mucronate. Munro in Trans. Linn. Soc. xxvi. (1868) 24; Bedd. Fl. Sylv., Forest. Man. p. ccxxx.; Trim. Cat. Ceyl. Pl. 110; Gamble Bamb. Brit. Ind. 7, t. 6.

CEYLON; Central Province, alt 6-8000 ft., Thwaites, &c. (C.P. n. 1).

Stems elongate; nodes rather enlarged, internodes 2-6 in. by  $\frac{1}{5}$  in diam., upper smooth yellow shining, lower glabrous or top hispid with long hairs. Leaves  $1\frac{1}{2}$  by  $\frac{1}{5}$  in, glaucous, glabrous, or hairy above glabrous beneath, one or both margins scabrous; midrib thick, primary nerves 2-3 pairs, obscure, transverse

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nervules obscure or 0; sheath glabrous, structe, paleaceous, ending in a ciliate callus and shortly auricled, with 2-4 short bristles. Spikelets 1 in., pedicels often obcuneate, glabrous or slightly pubescent; gls. I and II ovate, mucronate, 5-7-nerved; fl. gls. similar but longer; palea 2-cuspidate, hirsute, tip ciliate, keels smooth.

+++ Spikelets racemose.

7. A. densifolia, Munro in Trans. Linn. Soc. xxvi. (1868) 32; small, densely gregarious, leaves leathery densely imbricate subsessile lanceolate acute or long-acuminate spinulose-serrate tessellately nerved, base rounded or condate, spikelets 1-fld. in a dense panicle of leafy branchlets bearing racemes of 5-6 spikelets, fl. gl. long-mucronate. Trim. Cut. Ceul Pl 110: Gamble Bamb. Brit. Ind 8, t. 7

TRAVANCOR; on the Anamallay Hills, alt. 8500 ft., Beddome. CEYLON; Horton

Plains, alt. 7200 ft., and Pedrotallagalla, G. Thomson, Maxwell, Trimen, &c.

Stem 6 in.-3 ft., with stiff strong leafy branches arising from a thick scaly rhizome; internodes 1½-3 in. by ½ in. diam or less, smooth, walls rather thick; stem-sheaths 1 in. or longer, striate, hirsute, narrowed to the truncate acutely 2-auricled top; blade short, ovate. Leaves  $1-\frac{1}{2}$  by  $\frac{1}{5}-\frac{1}{3}$  in , tip glabrous, margins broadly cartilaginous, midrib thick, primary nerves 1-2 obscure, secondary 4-5 regularly tessellate with nervules; sheath striate, ciliate with whitish stiff hairs above; ligule short, rounded, hairy. Spikelets 40-1 in., rachilla glabrous; gl. I short, lanceolate; II broader, 5-nerved, keel scabrous; pales 2-mucronate, with a faint nerve outside each scabrid keel. Lodicules obovate, fimbriate. Anthers long. Ovary ellipsoid.

- 8. A. racemosa, Munro in Trans. Linn Soc. xxvi. (1868) 17; stem erect from a long rhizome, internodes scabrous, leaves linear-lanceolate tessellate tip setaceous, margins scabrous-serrulate, spikelets 4-8-fid. on short racemes of a simple terminal panicle of close leafy whorled branches surrounded by persistent sheaths, fig. gls. caudate-acuminate from a broad base ciliate. Gamble Bamb. Brit. Ind 9, t. 8; Mitford, The Bamboo Garden, 174. A. Gammieana, Gamble mss. (an Alpine form).
  - E. NEPAL and SIKKIM, alt. 6-12,000 ft.

Stems 5-15 ft. by 70-2 in. diam., walls thin, nodes a mere ring; internodes 12-15 in., blue-green when young; branches fascicled at the nodes; stem-sheaths usually 10 in., striate, covered with scattered stiff black hairs, narrowed convexly to the truncate tip; blade subulate, reflexed. Leaves 4-7 by \frac{1}{2}-\frac{2}{3} in., base rounded or narrowed into the very short petiole, glabrous or sparsely hairy above, midrib prominent, primary nerves 3-5 pairs, secondary 5-7, transverse nervules conspicuous; sheath 2-auricled with a chate membrane below the blade; ligule short, obtuse. Panicle with a glabrous rachis, pedicels 1-11 in., wayy, angular. Spikelets 1-11 in., rachilla clavate; gl. I and II very small, distant, acuminate; flg. gls. 7-9-nerved, setaceous, tip scabrid; palea shorter, 2-mucronate, tip scabrous, keels ciliate, nerves 0 or obscure.—Flowers raiely and only in the higher elevations, when the stem is sometimes reddish.

- \*\* Nodes of stem spinous (except A. Pantlingi).
- 9. A. Griffithiana, Munro in Trans. Linn. Soc. xxvi. (1868) 20; gregarious, internodes furrowed, nodes girt with a ring of tawny hairs, leaves thin linear-lanceolate acuminate tessellate margins smooth, tips setaceous, spikelets 4-6-fld. in whorled clusters on a terminal panicle which is surrounded by sheathing bracts, pedicels hairy, fig. gls. lanceolate longmucronate. Gamble Bamb. Brit. Ind. 10, t. 9.

BRITISH BRUTAN, Pantling KHASIA and JAINTEA HILLS, alt. 3-4500 ft., Griffith, &c.

Stems 10-30 ft. by 1-11 in. diam., olive-green; spines short, stout; internodes

7-9 in, stem-sheaths 6-9 in. by 4-5 in. broad at the base and  $\frac{3}{10}$  in. at the top, with a basal belt of thick soft tawny hairs, narrowed upwards, tip with rounded auricles, thinly covered with stiff tubercle-based hairs; blade  $\frac{1}{2}$  in., triangular, acute, hairy. Leaves 4-5 by  $\frac{1}{2}$  in or less, narrowed into a petiole, margins smooth, midrib shining, primary nerves 4-5 pairs, transverse nervules strong, sheaths striate, glabrous, ending in a narrow ring with a few stiff curved bristles, lighle rather broad, hairy. Printele with a hairy rachis, laterally flattened. Spitelets 1-1 $\frac{1}{2}$  in, narrow, rachilla long, flattened, top clavate, chate; gls. I and II ovate-lanceolate, mucronate, 5-7-nerved, scabrous, dorsally hairy above; fl. gls.  $\frac{1}{2}$  in., scabrous, hairy above, 7-nerved; palea 2-mucronate, keels chate. Authers with bearded tips—Only once seen in flower.

10 **A. Pantlingi,** Gamble Bamb Brit. Ind. 129, t. 118, tall, spines 0? nodes with a hairy ring, leaves lanceolate petioled tessellate smooth above scabrid on one margin, tip long twisted scabrid, spikelets panicled surrounded by sheathing bracts, pedicels glabrous capillary, nodes glandular, spikelets very natiow curved 6-10 fld, rachilla clavate with a tuit of white hairs beneath the ovate acuminate long-mucronate flg. gls.

BRITISH BHOTAN, on Rechi La, alt. 11,000 ft., Pantling.

Stems upwards of 1 in. diam , smooth; internodes 7-8 in. or more, cavity large , stem-sheaths about 10 in., smooth, striate, tapering to a convex top, margins longciliate; blade 3-4 by  $\frac{1}{3}$ - $\frac{1}{3}$  in., glabious, decurrent on the sheath into hairy auricles bearing 6-10 long curved bristles; ligule about 10 in , toothed, faintly cliate, dorsally pubescent. Leaves 5-7 by  $\frac{1}{2}-\frac{1}{4}$  in., base narrowed, petiole  $\frac{1}{3}-\frac{1}{3}$  in, midrib narrow pale shining, nerves 4-5 pans with 7-9 intermediate pans, cross-nervules very many, sheath glabrous, ending in a very hairy ring with a few twisted bristles, margins long-ciliate, ligule doisally pubescent. Panicles 4-6 in., terminal and avillary on leafless branches; bracts like small stem-sheaths, glabrous. Spikelets 2 in. or more, subverticillate, uppermost fig. gls. usually empty, rachilla about 1 in, whitepubescent; gls I and II empty, I in , II nearly in., 3-5-nerved, subclhate; fig. gls. prominently 7-nerved, keels scaprid; palea with 2-ciliate keels alternating with 3 nerves, tip 2-fid and 2-mucronate. Lodicules 3, ovate or obovate, acute, ciliate. Anthers linear, acute. Ovary glabrous, style short; stigmas 3, long, plumose. Grain oblong, dark brown, grooved, tipped with the style-base. - Differs from A. Griffithiana in wanting spines, in the different stem-sheaths, large leaves, longer spikerets, and glabrous anther tips.

11. A. callosa, Munro in Trans. Linn. Soc xxvi. (1868) 30; internodes smooth, nodes girt by the base of the tallen sheath, leaves thin oblong-lanceolate acuminate tessellate glandular-scabrid above pubescent beneath, margins scabrous-serrulate, spikelets bracteate 6-12-fid. in a branched avillary panicle ending in a leafy branchlet, fig. gls. ovate acute mucronate Gamble Bamb. Brit. Ind. 12, t. 10.

EASTERN HIMALAYA; in the Duphla Hills, alt 4500-6800 ft., Lister. Khasia Hills, alt 6000 ft., J D. H. & T. T., &c.

Stem 12-20 ft. by  $\frac{1}{2}-1$  in diam., smooth; nodes spinous and with a ring of soft brown hairs; internodes 6-10 in., walls above the spinous thickened nodes thin; stem-sheaths as long as the internodes or longer, thin, transversely nerved, narrowed from a softly hairy base to a narrow truncate tip; blade  $\frac{1}{2}-1$  in, subulate, hairy on both surfaces, annotes short fringed decurrent. Leaves 8-9 by  $\frac{1}{3}-1\frac{1}{3}$  in., narrowed from a suboblique base to the very short petiole, tip scabrous, midrib hairy shining above, primary nerves 5-S pairs, transverse nervules raised beneath with interposed pellucid glands; sheath densely tawny-pubescent, at length glabrous, tip with a ciliate callus and a few stiff curved bristles; ligule short, hairy. Panicle with the rachis striate, flattened on one side, and with a pube-scent vertical line, terminal joints clavate, hairy; bracts narrow, straw-colrd. Spikelets 2-3 in., rachilla very

prominent, glabrous; gl. I and II short, ovate, acute, glabrous, 1-3-nerved; fig gls. ovate, 3-7-nerved, tip ciliate; palea acute, thickly pubescent, keels ciliate. Anthers short, obtuse.

- Sect. II. Erect shrubs. Infl. of fascicled racemes on leafless or on both leafy and leafless stems, bracts small.
- 12. A. falcata, Nees in Linnea, ix. (1834) 478, stems annual, internodes smooth, nodes swollen, leaves small linear shortly petioled scabrid glandular between the nerves, above not tessellate tip setaceous twisted, infl of fascicled falcate racemes at the nodes, bracts short narrow membranous, fig. gls. 1-2 subacute mucronate 7-9-nerved, tips ciliate Gamble Bamb. Brit. Ind. 12, t. 11, 12; Mitford, The Bamboo Gurden, 167. P.A. utilis. Clegh in Journ. Agr. Hort. Soc. Ind. xii. (1865) 388.

WESTERN HIMALAYA; from the Ravi to Nepal, alt. 4-12,000 ft (tarely over 7000 ft.).

- Stems 6-10 ft. from a woody rootstock,  $\frac{1}{3}-\frac{1}{2}$  in. diam., green, sometimes pruinose; nodes glabrous or hirsute; internodes 6-12 in., walls thin; stem-sheaths papery, often 12 by 3 in, glabious and scaberulous above, hany beneath above the middle, margins ciliate, tapering to a truncate tip; blade  $\frac{1}{2}-2$  in. by  $\frac{1}{10}$  in., subulate recurved; ligule often  $\frac{1}{2}$  in., toothed. Leaves about 3-4 by  $\frac{1}{3}-\frac{1}{3}$  in., or 12 by 1 in. on young shoots, glands in rows like nervules pellucid; sheath glabious; ligule long. Panicles on separate stems. Spikelets  $\frac{1}{2}-\frac{2}{3}$  in.; rachilla cuneate, tip hairy; gl.  $\frac{1}{3}$  in., 3-5-nerved; II longer, 7-9-nerved, tip acute ciliate; fl. gls.  $\frac{1}{2}$  in., nucronate, scabrous; palea = fl. gl. or rather longer (margins of gl and palea often black).—There are two vars: a. typica, Gamble, spikelets distant in filhform falcate racenes;  $\beta$ . glomerata, Gamble, spikelets 3-4 together in close racenes or panicles.—A. utiles, Clerh., may be falcata or spathifora.
- 13. A. khasiana, Munro in Trans. Linn. Soc. xxvi. (1868) 28; stems annual, dark green or blackish, nodes prominent, branchlets fascicled dark colrd., leaves 3-4 by  $\frac{1}{3}$  in. linear-lanceolate glandular between the nerves not or hardly tessellate, infl. of fascicled falcate geniculate panicles at the nodes, bracts short ovate, fl. gl. mucrouate, margins above and tip cillate. Gamble Bamb. Brit. Ind. 15, t. 13.

KHASIA HILLS; alt. 5-6000 ft., common.

Most difficult to separate from A. falcata, but a stiffer stronger plant, panicle more dense and imbricated, flowers shorter, rachilla of spikelet hairy.

14. A. intermedia, Munro in Trans. Linn. Soc. xvi. (1868) 28; stems 8-12 ft. slender, nodes swollen with a prominent ring and whitish line below them, leaves very variable 8 by 1 in (in young shoots to 3-4 by ½ in.) linear- or oblong-lanceolate setaceously acuminate, base narrowed into a swollen petiole, nerves 3-7 pairs with 6-7 intermediates, spanngly tessellate with interposed pellucid glands, sheath collate with falcate auricles, infl of whorled racemose panicles, bracts axillary triangular, spikelets 3-5-fid., fl. gls 7-9- nerved. Gamble Bamb. Brit. Ind. 15, t. 14.

SIKKIM HIMALAYA, alt. 4-7000 ft., J. D. H, &c.

Stems greyish-green; internodes 5-10 in , walls  $\frac{1}{10}$ — $\frac{1}{6}$  in. thick; stem-sheaths 8-10 by 1-2 in. at base, glabrous, striate, narrowed upwards and truncate, ciliate below the small subulate blade. Leares bright green, upper surface and margins scabrid, midrib prominent; sheath with long marginal hairs, a minute ciliate callus below the petiole and on each side a falcate auricle bordered by stiff curved bristles; ligule long. Infi. on leafless stems. Spikelets  $\frac{1}{2}$ —1 in , yellow or purplish, nodes of rachilla clavate long-ciliate; gl. I and II ovate, membranous.—The long ciliate leaf-sheath is an excellent character.

15. A. Hookeriana, Munro in Trans. Linn. Soc. xxvi. (1868) 29; stems 15-20 ft. slender, nodes not much swollen ringed by the base of the sheath, leaves 6-12 by ½-1½ in. narrowed into a swollen petiole, nerves 4-8 pairs with oblique transverse pellucid glands not tessellate, sheath glabrous ninutely ciliate, ligule long, infl. of loosely fascicled falcate bracteate panicles, spikelets drooping 1-fid., fl. gl. large broadly ovate 3-nerved. Gamble Bamb. Brit. Ind. 17, t. 15.

EASTERN HIMALAYA, alt. 4-7000 ft.; Sikkim and W. Bhotan, J. D. H., Gammie, &c.

Stems 15-20 coespitose, glaucous green, with white scuif when young; older internodes 8 by  $\frac{2}{5}-1\frac{1}{3}$  in, with a dark blueish ring at the top, often striped green and yellow, walls  $\frac{1}{10}$  in. thick; stem-sheaths often 12-24 in. by 3-6 in. broad at the base, narrowed upwards and truncate; blade 3-6 in., linear; ligule  $\frac{1}{10}-\frac{1}{5}$  in., depressed in the middle. Leaves glaucous green when young, upper surface and margins scabrid; sheath ending in a broad callus and thin maked membrane. Infl. loose, on separate stems. Spikelets about  $\frac{1}{3}$  in., pedicelled; gl. I  $\frac{1}{10}$  in., 3-nerved, tip hairy; II  $\frac{1}{5}$  in. 5-nerved, mucionate; fl. gl. hard, involute, ang.ed, scabrous between the nerves; palea glabious, tip hirsute. Giannellipsoid.

Sect. III. Erect shrubs. Inflorescence usually in leafy panicles; bracts large.

16. A. spathiflora, Trin in Mem. Acad. Petersb. Ser. VI. iii. II. (1835) 617, Sp. Gram. Ic. t. 350; stem-sheaths oblong tip rounded, leaves 2-4 at the end of the branches, 3-5 by \$\frac{1}{3}\frac{1}{3}\$ in. linear-lanceolate tessellate, sheath loose, bracts enclosing 2-3 compressed 4-8-fld. spikelets, gl. I short obtuse, II long-mucronate, fig gls. 4-5 ovate long-acuminate, palea very short. Ruprecht. Bamb. 24, t. 2, f 5; Steud Fyn. Gram. 334, Brandis in Ind. Forester, xii. 206; Gamble Bamb. Brit. Ind. 17, t. 16; Mitford, The Bamboo Garden, 172. A. procera, Wall mss. Thamnocalamus spathiflorus, Munro in Trans. Linn. Soc. xxvi. (1868) 34, partly; Brandis For. Flor. 563. Bambusa macro, Wall. in Herb. Hook. (ex Munro) — Gen. Nov. Wall. Cat. n. 5041.

Western Himalaya; from the Sutley to Nepal, alt. 7-9000 ft., Wallich, &c. A gregatious shrub 12-20 ft. high. Stem  $\frac{1}{2}$   $\frac{3}{4}$  in. diam., smooth, young glaucous green and scurfy, older yellow or reddish-brown, nodes prominent, internodes 6-15 in., branchlets chiefly from the upper nodes, leafing branches with loose yellow sheaths 3-5 by  $\frac{1}{2}$   $\frac{3}{4}$  in. Stem-sheaths loose, glabrous, margins cliate, mouth  $\frac{1}{2}$   $\frac{3}{4}$  in. broad, with a few stiff bristles, ligule  $\frac{1}{10}$  in, fimbriate. Leaves shortly petioled, base narrowed, tip acute hairy; sheath 2-3 in., truncate, auricles bristly callus narrow, ciliate; ligule long-ciliate. Infl. usually on leafless stems, branches fascicled drooping, with narrow papery sheaths,  $1\frac{1}{2}$ -3 in. long. Spikelets 1- $\frac{1}{2}$  in., pedicelled; ra.hilla long, clavate, tip hairy; gl. I and II linear-lanceolate, glabrous; fl. gls.  $\frac{1}{2}$ -1 in. scabrous.—Distinguished from A. falcata by the tessellate leaves, and from jaunsarensis by the short rhizomes and tufted habit.

17. A. aristata, Gamble Bamb. Brit. Ind. 18, t. 17; stem-sheaths narrowed to a broad rounded top, leaves fascicled on jointed purple branchlets oblong-lanceolate tessellate, sheath loose keeled with a thickened spongy callus below the petiole, bracts of infl. broad enclosing 3-5 compressed 4-8-fld. spikelets, gl. I and II oblong-lanceolate scabrous 5-7-nerved, fl. gls. ovate long acuminate, palea nearly as long. Thamnocalamus spathiflorus, Munro in Trans. Linn. Soc. xxvi. (1868) 34, partly.

SIRKIM and BHOTAN HIMALAYA, alt. 9500-11,000 ft., Griffith's Collectors, Kurz, &c.

A gregarious shrub 8-12 ft. high, very closely allied to A. spathiflora, of which it is the Eastern representative, distinguished from that species in having broader bracts enclosing more spikelets, shorter leaves, a hairy callus below the longer petiole, longer mucros of the fig. gls. and a long more acuminate palea. It is readily recognized by its yellow stems and reddish branchlets. The stems are leafing only, or flowering only, or both.

18. A. Falconeri, Benth in Gen Plant. iii. 1208; stem-sheaths oblong top narrowed truncate, leaves 3-6 by  $\frac{1}{2} - \frac{3}{4}$  in. oblong-lanceolate soft thin petioled not tessellate but with a few pellucid glands, sheath glabrous with ciliate margins and a minute narrow ciliate callus below the petiole, ligule long harry, bracts of large leafy panicles ovate-lanceolate, spikelets 1-fid., gl. I and II oblong acute or muoronate 3-5-nerved, fl. gl. ovate-lanceolate muoronate 5-7-nerved, palea as long or longer. Gamble Bamb. Brit. Ind. 20, t. 18; Mifford, The Bamboo Garden, 169. Thamnocalamus Falconeri, Hook. f. ex Munro in Trans Linn. Soc. xxvi. (1868) 1834; Brandis For. Fl. 563. Bambusa floribunda, Munro in Herb. Trin. Coll. Dublin.—Bambusondes, Wall. Cat. n. 5040.

TEMPERATE HIMALAYA; from Kumaon to Bhotan, alt. 7-9000 ft., Wallich, &c. Tall, shrubby. Slem \( \frac{1}{2} \) \text{in.} diam., young smooth, old scurfy-white, often striped yellow and green; nodes raised, base of sheath persistent; internodes 8-15 in., walls \( \frac{1}{2} \) in. thick; branches many at the nodes with bractente sheaths. Stem-sheaths 8-12 by 2-3 in.; ligule narrow, dark, hairy. Leaves smooth on both sides, ligule rounded hairy. Rachts of raceme flexuous, flattened. Spikelets with a terminal free rachilla, and a ring of hairs below the fig. gl; keels of palea glabrous except at the tip, 1-nerved on each side.—The small sheaths enclosing short sinuous racemes, and the absence of transverse nervules in the leaves characterize this species.

Sect. IV. Climbing shrubs. Stamens 6 or fewer.

19. A. Prainii, Gamble Bamb. Brit. Ind. 21, t. 19; stem slender wiry, leaves 2-4 by  $\frac{1}{3}$ - $\frac{7}{4}$  in. not tessellate, sheath with a glabrous callus below the petiole, spikelets distant pedicelled on a wiry rachis, gl. I lanceolate keeled cihate, II ovate acute 5-nerved, flg. gls. 3-6 on a flexuous clavate rachilla triangular acute 9-11-nerved. Microcalamus Prainii, Gamble in Journ. As. Soc. Beng. lix ii. (1891) 207, t. 7.

Assam; on the Naga and Jaintea Hills, alt. 3500-7870 ft., Prain, &c.

Stem up to 30 ft. long, yellowish,  $\frac{1}{6}-\frac{1}{3}$  in. diam.; nodes swollen, solid or walls thick; branches fasc cled. Stem-sheaths 2-6 by  $\frac{1}{3}-\frac{3}{4}$  in, narrowed to a point in the upper half with an acicular blade. Leaves 2-4 in. thin, quite glabrous, base rounded petioled, tip curved setaceous; sheath smooth; ligule long, rounded Infl. of axillary and terminal punicles of spikelets in the axils of sheathing bracts. Spikelets  $1-\frac{1}{2}$  in., pedicels slender; empty gls. 2-3, nodes of rachilla clavate flattened; gl. I margins chate; II tip chiate; fl. gls. falcate, strongly nerved; palea as long, talcate; keels minutely chate. Stamens 6.

- B. Species of which the flowers are unknown.
- \* Stem-sheaths 2-8 in., imperfect blade generally recurved.
- † Leaves tessellate with transverse nervules.
- § Stems tufted on a short rootstock.
- 20. A. microphylla, Munro in Trans. Linn. Soc. xxvi. (1868) 32;

stems 2-4 ft., leaves  $\frac{1}{2}$ -1 by  $\frac{1}{10}$ - $\frac{1}{3}$  in. linear-lanceolate acute mucronate tessellate. sheath hairy above tip long-fimbriate. Gamble Bamb. Brit. Ind. 22. Bambusa microphylla, Griff Journ. 1. 242, 259, &c.

BHOTAN, alt 6-10,000 ft., Griffith.

A gregarious low shrub, forming large patches in wet places, internodes 2-3 in., glabrous; branches 1-whorled at the nodes. Leave, with almost membranous fimbriate or glabrous margins, nerves 2 pairs; sheath often dark; ligule obscure.—Descript, after Munio.

21. A. hirsuta, Munro in Trans Linn. Soc xxvi. (1868) 30; stems 4-8 ft solitary from the rhizome often strigosely hairy above, leaves 3-5 by \(\frac{2}{3}\)\square\(\frac{2}{3}\)\sin tessellate strigosely hairy beneath, sheath strigosely bristly ending in a hairy callus and reflexed spinescently bristly auricle. Gamble Bamb. Brit Ind 22, t. 20.

KHASIA and NAGA HILLS, alt. 5000-9500 ft., Griffith, &c

Stems grevish-green, 1-1 in. diam, nodes glabrous; internodes up to 13 in., walls rather thin. Stem-sheaths 6 in. by 1 in. broad at the base, top rounded with large recurved long-ciliate auricles; blade subulate, recurved; ligule narrow, pubsicent. Leaves tessellate, smooth above, hairs white beneath, margins cartilaginous scabious-serrate, midiib narrow shining, nerves 4-6 pairs, ligule long, hairy.—Resembles A. Wightiana, differing in the well marked auricles and bristles of both stem- and leaf-sheaths.

22. **A. Gallatlyi,** Gumble Bamb. Brit. Ind. 23, t. 21; stems thin, leaves 3-4 by  $\frac{1}{2}-\frac{3}{4}$  in. tessellate whitish beneath base narrowed into a short petiole sheath ending in a narrow callus with about 3 long stiff bristles.

TENASSERIM, Moolyet Hill, alt. 6000 ft., Gallatly

A gregarious shrub Branches smooth, glabrous, striate, sometimes channelled. Sheaths of branchlets narrow, with imperfect blades and long ligules. Leaves pale green, tessellate, tips setaceous, scabrid, smooth above, one margin scabrid, nerves 3 pairs; ligule triangular, pubescent.

- §§ Stems distant on elongated rhizomes
- 23 **A. jaunsarensis**,  $Gamble\ Bamb$ . Brit. Ind. 23, t. 22; stems slender reed-like, leaves 4-6 by  $\frac{1}{2}-\frac{3}{4}$  in lanceolate acuminate tessellate base obliquely cureate, sheath ending in falcate arricles with a few bristles.

Western Himalaya; hills of Jaunsai in Gaiwhal, alt. 7-8000 ft., Gamble. Rhizome long, creeping, clothed with shining imbricate ovate acute scales. Stems 2-3 ft apait, 10-15 ft. high, \( \frac{1}{2} \) in. diam., young glaucous, old greenish-brown, internode, 9-11 in. Stem-sheaths 6-10 in by 1\( \frac{1}{2} -2 \) in. broad at the base, narrowed to a truncate 2-auricled bristly tip; blade 1-3 in, subulate, recurved; ligule short, pubescent. Leaves thin, smooth above, scaberulous beneath, margins scabrous-serrate, tessellate, nerves 4-5 pairs; sheath with falcate auricles that bear 5-6 stiff bristles; ligule short, truncate, pubescent.—Nearest to A. spathifora, distinguished by its rhizome, solitary green stems, auricled sheath, and thinner leaves.

24. **A. Rolloana**, Gamble Bamb. Brit Ind. 24, t. 23, stems rather rough somewhat flattened on one side, lower nodes rooting, leaves 6-8 by  $1-l\frac{1}{2}$  in. oblong-lanceolate acute tessellate base rounded sparsely hairy beneath, sheath ending in a rounded long-ciliate auricle.

ASSAM; Naga Hills, alt 5-7000 ft , J. Rollo.

Rhizone at first clothed with imbricating scales, afterwards jointed, joints about  $\frac{1}{2}$  in long. Stems 8 ft. by  $\frac{1}{6}$  in diam., green then yellow, lower nodes rooting;

internodes 10-12 in., walls thin. Stem-sheaths 4-6 by 1-2 in., covered with at length deciduous bristles, shining, margins ciliate, suricles falcate and with long bristles, blade subulate recurved. Leaves glabrous above, tessellate, margins curtilaginous spinulose-scabrous, nerves 8-10 pairs; petrole broad, flat, ligule long, membranous, deeply cleft. Remarkable for its broad leaves.

25. A. armata, Gamble Bamb. Brit. Ind. 130, t. 119, rootstock creeping, stems solitary, nodes smooth slightly thickened, leaves oblong-lanceolate long-acuminate tessellate smooth above slightly rough beneath, margins scabrid, midrib pubescent above.

Hills of UPPER BURMA, alt 5500 it, Oliver.

- Evergreen. Stems about 20 ft by  $1-1\frac{5}{4}$  in. diam., green, straight, smooth, walls very thu; nodes with a belt of straight smooth spines, internodes about 8 in; stem-sheaths 6-8 in. by  $2\frac{1}{2}-3$  in. broad at the base, thin, tapering to a very narrow tip, smooth or with scattered hairs above the middle, margine ciliate; blade about  $\frac{1}{10}$  in, triangular, pubescent; ligule very narrow, ciliate. Leaves 6-9 by  $\frac{3}{4}-1\frac{1}{4}$  in, bright green, base narrowed, putiole  $\frac{1}{10}-\frac{1}{3}$  in., tip twisted scabrid, midnib narrow pale shining, nerves 6 pairs with 5-7 intermediate, transverse nervules very many irregularly spaced; leaf-sheaths striate, ending in small calli and bearing 10-12 stiff bristles; ligule very short, ciliate. Inflorescence unknown.—Near A. callosa, Munro, but quite distinct.
  - †† Leaves not or inconspicuously tessellate by transverse nervules.
- 26. A. suberecta, Munro in Trans. Linn. Soc. xxvi. (1868) 32, stems coespitose wiry erect, leaves narrow 2-4 by  $\frac{1}{5}-\frac{1}{3}$  in. subsessile linear not or hardly tessellate, base narrowed margins revolute, sheath ending in a callus with a few deciduous bristles. Gamble Bamb. Brit. Ind. 25, t. 24.

SIKKIM HIMALAYA, Kennedy. KHASIA and JAINTEA HILLS, alt. 4000-5000 ft. Greffith, &c.

Stems 10-15 ft. by \( \frac{1}{3} \) in. diam., olive-green, smooth; nodes slightly swollen; internodes 6-10 in., walls thick; branchlets short, whorled. Stem-sheaths 2-6 by \( \frac{1}{3} \) in. broad at base, glabrous, gradually narrowed to a naked or fimbrate mouth; blade \( \frac{1}{2} - \frac{1}{3} \) in., subulate, recurved; ligule long, tip fimbrate. Leaves pale beneath, with many pelluand glands, tip setaceous, margins scabrous-serrate, nerves 3-4-pair; ligule rather long, pubescent.

27. A. Kurzii, Gamble Bamb. Brit. Ind. 25, t. 25; nodes with a thick ring bearing very many long wary geniculate branches, leaves 2-4 by  $\frac{1}{6}-\frac{1}{3}$  in subsessile very thin linear-lanceolate acute obscurely tessellate, base unequally narrowed, sheath slender structe, ending in a small callus and a few thin cilia.

SOUTHERN BURMA; on the coast, Kurz.

Apparently a bushy shrub. Stem smooth,  $\frac{1}{3} - \frac{1}{2}$  in. diam. Leaves acute with a short point, smooth on both surfaces with a few long tubercle-based hairs on the nerves beneath, costa thin pale, nerves 2 pairs, transverse nervules very few and inconspicuous; ligule short sometimes ciliate.—Remarkable for its thin leaves and geniculate pale branchlets.

- \*\* Stem-sheaths 12-18 in. long, blade long.
- 28 **A. Mannii**, Gamble Bamb. Brit. Ind. 26, t. 26; stem tufted climbing wiry solid, blade of stem-sheath 6-10 in linear, leaves 6-9 by  $\frac{3}{4}$ -1 in petioled lanceolate hirsute beneath not tessellate.

ASSAM: Jaintea Hills, alt. about 3000 ft., Mann.

Stems 30 ft., much branched, nodes thickened, branches many geniculate; intended 3 ft., smooth. Stem-sheaths 12-18 in., convolute, slender; rough with Vol. VII. C C

appressed bristles; ligule narrow, toothed. Leaves papery, base narrowed or rounded, tip thickened hirsute surmounted by a capillary bristle; sheath ending on one side in a round shining exauricled callus, on the other in a short pointed auricle with a few bristles; petiole wrinkled; ligule small, hairy, ciliate—A curious species resembling A. Prainii, remarkable by its long narrow sheaths; its leaves resemble those of Cephalostachyum.

### 133. PHYLLOSTACHYS, Sieb. & Zucc.

Cospitose shrubs. Stems smooth, flattened on one side, branches fascicled at the nodes. Stem-sheaths rounded above, blade subulate. Leaves jointed on the sheath, spinulose on one margin, tessellate, sheath loose. Infl. of spicate branchlets in a leafy terminal panicle with imbricating bracts. Spikelets 2-3, 1-4-fld with a terminal imperfect rachilla jointed between the fls.; empty gls. 2-3, many-nerved, often bearing an imperfect blade; flg. gls. ovate-lanceolate, acuminate, many-nerved; palea 2-keeled, many-nerved. Lodicules 2. Stamens 3. Ovary stipitate, rounded, glabrous, style long, stigmas 3.—Species about 20, Eastern Asiatic.

1. P. bambusoides, Sieb. § Zucc. in Abh. Akad. Munch. iii. (1843) 745, t. 5, f. 3; leaves thin, mouth of sheaths with long bristles. Steud. Syn. Gram. 339; Munro in Trans. Linn. Soc. xxvi. (1868) 36; Franch § Sav Enum. Pl. Jap. ii. 182; Gamble Bamb. Brit. Ind. 27, t. 27; Mitford, The Bamb. Gard. 155. P megastachya, Steud. l. c. Bambusa reticulata, Rupr. Bamb. 58. B. bifolia, Sieb. mss. ex Munro.

UPPER ASSAM; Mishmi Hills (without flowers), Griffith.—DISTRIB. China, Japan.

Stems 10-12 ft., \(\frac{1}{2} - \frac{2}{3}\) in. diam., graceful, smooth, yellow, nodes glabrous, internodes short, branches semiverticillate. Stem-sheaths 6-10 in, thin, top contracted into a short neck then rounded and truncate, margins produced to meet the ligule with a few bristles; blade subulate; ligule long, toothed. Leaves 3-4 by \(\frac{1}{2} - \frac{2}{3}\) in., oblong-lanceolate, tip setaceous, glaucous and with stiff white hairs beneath, nerves 5-6-pairs; petiole black, bairy; sheath keeled, ciliate on one margin, mouth with bristles on a short auricle; ligule rounded. Bracts of infl. short, obtuse, sheathing 3-5 spikelets and with an imperfect blade. Spikelets 1-1\(\frac{1}{3}\) in.; gl. I very large, sheath-like, truncate, with a green cordate blade; II oblique, keeled, few-nerved, keels ciliate; fig. gls. \(\frac{3}{4}\) in., ovate, acuminate, many-nerved; palea as long.—Description from Hongkong specimens.

2. P. Mannii, Gamble Bamb. Brit. Ind. 28, t. 28; leaves thick, mouth of sheath nearly naked.

KHASIA HILLS, alt. 5000 ft., cult. (said to have come from the Naga Hills), Mann.

Stems 15-20 ft. by 1-1½ in. diam.; internodes 8 in., yellow. Stem-sheaths papery, 8-9 by 1-2 in., top rounded and truncate; blade 2-3 in., subulate; ligule broad, pectinate. Leaves 4-5 by ½-½ in., base rounded, tip shortly acummate, glabrous or nearly so, one margin spinulose-serrate, costa prominent, nerves 5 pairs; sheath loose, ending in a narrow ciliate callus with a few bristles; ligule broad, long-pectinate. Inf. unknown.

## 134. BAMBUSA, Schreb.

Shrubs or trees, usually large and coespitose, rarely climbing; stemsheaths broad, blade often triangular. Leaves shortly petioled not tessel late by nervules, but sometimes by pellucid glands, sheaths variously auricled. Infl. generally a large leafless panicle bearing heads on spiciform branches, or of leafy panicles, or panicled spikes. Spikelets 1- many-fid.; lower gls. 1-4, empty or gemmiferous; fl. gls. ovate-lanceolate, uppermost imperfect; palea 2-keeled. Lodicules 2-3, membranous, ciliate, rarely 0. Stamens 6. Ovary oblong or obovate, tip hairy; style long or short, stigmas 2-3. Grain oblong or linear-oblong, furrowed on one side; pericarp thin, adherent.—Species about 50, Eastern Asiatic, Malayan, and one Australian.

In ennmerating the nerves of the leaves the principal ones on each side of the

midrib alone are given.

A. Species of which the flowers are known.

Sect. I. Arborescent (except B. nana and affinis). Stem not spinous. Spikelets cylindric, except B. Balcooa. Lodicules 3.

- \* Spikelets in loose heads.
- † Stem-sheaths with a triangular reniform or cordate blade, auricles large.
  - § Keels of palea more or less ciliate or toothed.
- 1. B. Tulda, Roxb. Fl. Ind. ii. 193; leaves linear-oblong or -lanceolate, spikelets 1-3 in. in interrupted clusters mixed with chaffy bracts usually 1-2 bracteolate 4-6-fld., lowest 3-4 gls. acute many-nerved usually gemmiparous, flg. gls. \(\frac{1}{2}\)-1 in. ovate acute acuminate or mucronate, palea shorter cymbiform, anthers obtuse glabrous purple, ovary obovate-oblong. Munro in Trans. Linn. Soc. xxvi. (1868) 91; Brand. For. Flor. 566; Kurz For. Fl. Burm. ii. 552; Gamble Bamb. Brit Ind. 30, t. 29. B. Macala, Ham ex Wall. Cat. n. 5026 A. B. trigyna, Roxb. mss. in Herb. Mus. Brit. Dendrocalamus Tulda, Voigt Hort. Suburb. Calcutt. 718.—Bambusa, Wall. Cat. n. 5026 A, 5027, 5030 B, C.

BENGAL, ASSAM, the NORTHERN CIRCARS, and BURMA, wild and cult.

Gregarious. Stems 20-70 it., 2-4 in diam.; nodes not swollen; internodes 1-2 ft., white-ringed below the nodes, walls \( \frac{1}{3} \)-\frac{1}{2} in. thick. Stem-sheaths 6-9 by 6-10 in. broad below, narrowed upwards, tip rounded or subtriangular, glabrous harry or white-powdered; blade hairy within, auricles long-fringed. Leaves 6-10 by \( \frac{3}{4} - 1 \frac{1}{2} \) in, base usually rounded, tip subulate twisted, beneath glaucescent and puberulous, pellucid glands faint, nerves 6-10 pairs; petiole often harry; sheath glabrous, ending in a smooth callus and oblong long-fringed auricle; ligule narrow, obscure. Infl. variable, from an immense radical leafiess panicle to a short leafy panicle or spiciform branch; rachilla clavate, flattened, fragile; palea 5-7-nerved between the keels, tip penicillate. Lodicules 3.—Flowers gregariously and in single

2. **B. nutans,** Wall. Cat. n. 5031; stems solitary from a creeping rhizome, leaves linear-lanceolate tessellate with pellucid glands, ligule long obtuse hairy, spikelets in bracteate fascicles many empty or gemmiparous, fertile few \(\frac{3}{4}\)-1 in., 2-3 lowest gls. neuter 3-7 fertile all ovate acute mucronate many-nerved pubernlous within, palea shorter ovate flattened keels overlapping long ciliate, anther-tips long apiculate or slightly penicillate, ovary subovoid. Munro in Trans. Linn. Soc. xxvi. (1868) 92; Brand. For. Flor. 567; Gamble Bamb. Brit. Ind. 32, t. 30. B. crinita, Thoms. ex Munro l. c. 157. Bambusa Falconeri, Munro l. c. 95 in part.—Bambusa, Wall. Cat. n. 5030 A.

LOWER HIMALAYA; from the Jumna to Assam and Eastern Bengal, ascending to 5000 ft. in Sikkum.

Stems 20-40 ft. by  $1\frac{1}{2}$ -3 in. diam., graceful, naked below, straight, nodes not much raised often harry, lower rooting; internodes 15-18 in., not shining, whiteringed below the nodes, thick-walled. Stem-sheaths 6-9 in., top roundly truncate, dorsally clothed with black hairs, base with a ring of soft deciduous hairs; blade of lower nodes and uppermost shoots 6-9 in., of middle nodes shorter, acute, blackhairy within, margins recurved, base rounded decurrent on the top of the sheath with large waved densely bristly auricles, bristles long curved. Leaves 6-12 by 1-11 in., white beneath when dry, tip twisted scabrid, midrib and margins scabrid, nerves 7-10; sheath ending in a smooth callus and falcate auricle with long bristles. Infl. a stiff panicle with spiciform branches. Lodicules 3, long-fimbriate.-Difficult to distinguish from B Tulda without flowers, except by the rhizome. B Falconeri, Munro, was founded on flower of B, nutans and leaves of Dendrocalamus Hamiltoni.

3. B. teres, Ham. ex Wall Cat. n. 5026 B; stems coespitose, leaves large oblong-lanceolate tessellate by pellucid glands, spikelets 1-2 in. in bracteate heads neuter and fertile, 1-2 lowest gls. empty or gemmiparous ovate acute mucronate, fig. gls. 5-6 ovate-lanceolate from a broad base acute many-nerved tip sometimes foliaceous, palea ovate acute scaberulous 5-6-nerved between the toothed keels, anthers narrow tips penicillate. Munro in Trans. Linn Soc. xxvi. (1868) 95; Gamble Bamb. Brit. Ind. 33. t. 31.

EASTERN BENGAL; Gongachora, Hamilton Assam, Jenkins.

Stems 60 tt by 3 in. diam , nodes ringed by the bases of fallen sheaths; internodes 20 in., walls  $\frac{3}{10}$ ,  $\frac{4}{10}$  in thick. Stem-sheaths 8-10 in. long and broad, hardly narrowed upwards, top rounded, nearly glubrous; blade 4-6 in., triangular, cuspidate, base rounded and decurrent in broad wavy fringed auricles, appressed-harry beneath; ligule narrow, white-hairy. Leaves 12-14 by 11-13 in., tip long-acuminate twisted scabrid, base unequally narrowed shortly pubescent beneath, nerves 10-16, pellucid glands many; sheath ending in a broad shining callus; ligule short. Infl. a large compound panicle with spiciform branches bearing fascicles of spikelets and chaffy bracts. Lodicules sub-obovate, fimbriate, many-nerved.

4. B. Ridleyi, Gamble Bamb. Brit. Ind. 34, t. 32; leaves 12-14 by  $1\frac{1}{3}$ -2 in. margins smooth, sheath exauricled, ligule deeply 2-lobed, spikelets 1-2 in few in distant clusters 3-5-fld many neuter, empty gls. 2-4 ovate acuminate, fl. gls. ovate-lanceolate mucronate many-nerved, palea shorter oblong keels minutely ciliate near the 2-fid tip, anthers long narrow setosely apiculate.

SINGAPORE, at Bukit Timah, Ridley.

Leaves oblong-lanceolate, tip subulate scabrid with its margins recurved, scaberulous above, smooth beneath, nerves 10-12 pair, petiole broad; sheath appressed hairy, subcarinate, ending in a narrow callus, margins truncate at the ligule which has long stiffy ciliate lobes. Infl. on long spiciform leafy branches bearing very distant clusters of few spikelets. Rachilla short. Palea many-nerved between the keels. Lodicules 3, many-nerved, long-fimbriate. - Habit and stemsheaths unknown.

5. **B. burmanica**, Gamble Bamb. Brit Ind. 35, t. 33; leaves of young plants 10-12 by  $\frac{1}{2}-2$  in. white-hairy on both surfaces of older smaller smooth above hairy beneath, ligule short, spikelets 1 in. or less in spiciform branches of a panicle each in the axil of a long narrow truncate bract, empty gls. 2 mucronate, fig. gls. 5-6 ovate acute many-nerved, palea elliptic-ovate keels ciliate, anthers narrow tips apiculate.

UPPER BURMA; Katha district, Oliver.

Stems 50-60 ft., 4 in. diam., dull green, nearly solid, internodes 12 in. with a ring of white hairs below the not much swollen nodes. Stem-sheaths green with yellow margins, rather broader than long, top rounded, sides with appressed golden hairs; blade broadly cordate, cuspidate, base dilated into large rounded fringed auricles; ligule short. Leaves oblong-lanceolate, base unequally narrowed or rounded, tip with a twisted scabrous point, pellucid glands many, nerves 5-8 pair; sheath reddish-brown, keeled, tip truncate with a small deciduous auricle and deciduous cilia; ligule short, denticulate. Infl. a panicle of spiciform branches; rachilla short, thick Lodscules 3, 5-6-nerved, ciliate. Ovary stipitate. Grain oblong, top hairy—A large handsome species.

- §§ Keels of palea eciliate.
- 6. **B.** polymorpha, Munro in Trans. Linn. Soc. xxvi. (1868) 98; leaves small linear at first hairy on both surfaces, ligule very short, spikelets about  $\frac{1}{2}$  in. few together in many bracteate fascicles born on the long spiciform branches of a large panicle, shining, each in the axil of a long bract, empty gls 1-3 ovate acuminate, fig 2-3 ovate mucronate manynerved, palea rather longer lanceolate, anthers obtuse or apiculate. Kurz For. Fl Brit. Burm. ii. 553; Gamble Bamb. Brit. Ind 36, t. 34. Bambusa cyanostachya, Kurz MS in Herb. Kew.

EASTERN BENGAL, PEGU & MARTABAN, Biandis, &c.

Evergreen, tutted, sometimes deciduous; stems attaining 50-80 ft. by 3-6 in. diam., curving outward, young white-scurfy, nodes thickened; internodes 15-24 in. Stem-sheaths 6-7 in by 12-14 broad, thick, dorsally densely white-pubescent, narrowed upwards and curved; blade remform, 3 in long, planted and long ciliate below, base rounded and dilating into a broad band lining the top of the sheath, annoles falcate, the whole fringed with bristles; ligule narrow, entire. Leaves 3-7 by ½-½ in., base rounded or narrowed, nerves 4-6 pairs; sheath compressed, hairy, ending in a callus and minute auricle with deciduous bristles. Spikelets often brownish, subpedicelled, enclosed in a long curved glabrous bract. Lodkcules 3, suborbicular. Anthers purple. Grain ½ in., ovate, plano-convex, top hairy.

†† Stem-sheaths with a very long or narrow or imperfect blade, auricles 0 or minute, keels of palea ciliate.

7. **B. pallida**, Munro in Trans. Linn Soc. xxvi. (1868) 97; coespitose, blade of stem-sheaths very long auticles small, leaves linear-lanceolate glabrous above often white-hisute beneath, spikelets 1-1½ in. fertile and neuter on the spiciform branches of a large panicle, 1 or 2 lowest gls. ovate acute empty, then one male or gemuiparous followed by 3-8 fig. and 3-5 imperfect, fig. gls. ovate acute many-nerved, palea much shorter acute, anthei-tip 1-2-setose or naked, ovary narrowed into the hairy style. Gamble Bamb Brit. Ind. 37, t. 35. B. critica, Kurz in Journ As. Soc. Beng. xlii. (1873) ii. 250. Dendrocalamus criticus, Kurz For. Flor. Brit. Burm. ii. 559.

SIKKIM HIMALAYA, N & E. BENGAL, the KHASIA HILLS, ASSAM, UPPER

BURMA & PEGU, alt 5-6000 ft. (cult in the plains below).

Stems graceful, 40-60 ft. by 2-3 in. diam., olive green; nodes not prominent; internodes 18-30 in., walls thin. Stem-sheaths 7-12 by about 10 in. broad, top straightly truncate, young more rounded, glabrous or hairy; blade up to 14 in., triangular, acuminate, sparsely hairy, margins and very small auricles bristly; ligule very narrow. Leaves 4-8 by  $\frac{1}{2}$ - $\frac{3}{3}$  in., tip subulate scabrid twisted, nerves 4-6;

sheath glabrous, ending in a smooth callus and a rounded erect fringed auricle; ligule very short. Panicle very large, pale. Spskelets pale, sometimes curved; rachilla short, clavate, palea 3-5-nerved between the keels. Lodicules 3. Stigmas 3.—Very like B. Tulda, but distinguished by the stem-sheaths, smaller narrow leaves, and overy.

8. **B. affinis**, Munro in Trans. Linn. Soc. xxvi. (1868) 93; shrubby, blade of stem-sheaths small lanceolate, leaves lanceolate or oblong-lanceolate scabrid beneath tessellate by pellucid glands, sheath setose keeled, ligule broad, spikelets about 1 in. in small distant whorls on terminal leafy spikes or panicles 6-10-fld. coriaceous shining, fig. gls. acuminate very-many-nerved folded at the base, palea much narrower, ovary sub-obovoid. Kurz For. Fl. Brit. Burm. ii. 551; Gamble Bamb. Brit. Ind. 39, t. 36.

Forests of Martaban & Burma E. of the Sittang river, Kurz, Brandis.

Stems 15-20 ft. by 1-1½ in. diam., pale green or striped with white, appressed-pulescent; internodes 1-2 in., tubular, with black hairs below the slightly thickened nodes. Stem-sheaths 4-6 in. long and broad, green, later straw-colrd., glabrous or with patches of appressed hairs, top rounded; blade 1-2 in., longer in young shoots, usually recurved, appressed hairy within, base decurrent as a narrow terminal wing of the sheath; ligule narrow. Leaves 6-10 by 1-1½, petiole rather long, points twisted scabrid, nerves 8-10; sheath ending in a short callus. Spike-lets in small whoils; rachilla short, top bearded; palea 7-nerved between the keels, 4-nerved beyond them. Lodicules 3, many-nerved. Stigmas 3.

9. **B. khasiana**, Munro in Trans. Linn. Soc. xxv1 (1868) 97; stem solitary from a creeping rootstock, blade of stem-sheaths with large inflated wings above the contracted base, leaves lanceolate or oblong-lanceolate and sheaths glabrous, spikelets sterile (short) and fig. (long)  $\frac{6}{10} - \frac{1}{10}$  in. in distant heads on the spiciform branches of a long paniele 1-4 lowest gls. empty or gemmiparous ovate mucronate strongly nerved, fig gls. 2-3-fid 11-13-nerved, tip hairy within, palea as long as the gl. or longer manynerved, anthers obtuse, ovary narrowed into the style. Gamble Bamb. Brit Ind. 39, t. 37.

KHASIA to the MUNNEPORE HILLS, alt. 1-4000 ft., J. D. H. & T. T., &c.

Stems 30-40 ft. by  $1-1\frac{1}{2}$  in. diam., graceful, fistular, rather soft, dull olive green, young golden hairy; internodes 5-15 in. with a whitish ring below the not prominent nodes and bluish ring above them; walls  $\frac{1}{10}$   $\frac{3}{10}$  in. Stem-sheaths 5-6 by 4-5 in., tawnily hairy, straight top truncate; blade as long as the sheath or longer, cuspidately acuminate, auricles 0; ligule narrow. Leaves 4-9 by  $1-1\frac{1}{2}$  in., pale, tip setaceous shaggy, nerves 6-8 obscure; sheath ending in a broad callus and minute setose auricle; ligule elongate, truncate. Spikelets cylindric, at length flattened. Branches of panicle fistular Lodicules short, broad, fimbriate. Stigmas 3.

9\*. B. NANA, Roxb. Fl. Ind. ii. 190; dwarf, shrubby, blade of stemsheaths linear, leaves small linear-lanceolate, spikelets ½-1½ in. few clustered or solitary on the branches of short diffuse panicles, gls 5 or more all fig. rarely the lowest empty ovate acute many-nerved, palea shorter than the gl. keels minutely ciliate at or near the tip only, anthers obtuse or subapiculate yellow, ovary obovoid. Wall. Cst. n. 5036; Munro in Trans. Linn. Soc. xxvi (1868) 89; Kurz For. Fl. Burma, ii. 551; Ind. Forester, ii. 339; Trim. Cat. Ceyl. Pl. 110; Gamble Bamb Brit. Ind. 41, t. 38. B. caesia, Sieb. & Zucc. fid. Munro. B. glauca, Lodd. Cat.; Lindl. in Penny Cycl. iii.

(1835) 357. B. glaucescens, Sieb. Cat. fid. Munro. B. sterilis, Kurz in Miq. Ann. Bot. Lugd. Bat. ii. 285. B. viridi-glaucescens, Carr. in Rev. Hortic. 1869, 292. Arundinaria glaucescens, Beauv. Agrost. 144; Nees Agrost. Bras. 526; Kunth Enum. Pl. 1. 426; Rupr. Bamb. 23, t i. p. 3, Steud. Syn. Gram 334; Miq. Fl. Ind. Bat. iii. 413; Munro l. c. 22. Ischurochloa floribunda, Buse in Miq. Fl. Ind. Bat. iii. 413; Munro l. c. 22. Ludolfia glaucescens, Willd. in Ges. Naturf. Fr. Berl. Mag. ii. (1808) 320. Panicum arborescens, Lamk. Encycl. iv. 749. Triglossum arundinaceum, Fisch. ex Roem. & Sch. Syst. Veg. 846.

MALAYAN PENINSULA; Pahang, alt. 7000 ft., Wray (wild?). Cultivated in Ceylon (CP. n. 4022) and in many parts of India.—Native of China and Japan.

Stems 6-10 ft., ½-1 in. diam, densely tufted, hard, green then yellow, branched from the base; nodes thickened; internodes 8-15 in. Stem-sheaths 4-6 by 2-3 in. broad, stiff, glabrous, narrowed upwards, top rounded; blade 2-3 in., acuminate, decurrent on the sheath, ciliate, appressed-hairy or glabrous above; ligule narrow, entire. Leaves 2-4 by ½ in., distichous, tip subulate twisted, not tessellate, costa faint, nerves 3-6; sheath ending in a prominent callus, auricle fringed; ligule short. Spikelets straw-colrd.; rachilla flattened, glabrous; palea many-nerved. Lodicules linear. Style very short. Grain elliptic, furrowed, shortly beaked, top hairy.

- \*\* Spikelets ovate-lanceolate in dense heads, flattened.
- 10. **B. Balcooa**, Roxb. Fl. Ind. ii. 196; stem-sheaths dimorphic, leaves oblong-lanceolate base rounded, sheath hairy, heads of spikelets bracteate, spikelets  $\frac{1}{3} \frac{1}{2}$  in. or more, empty gls. 0-2 ovate acute manynerved, fig. gls. 4-6 larger margins ciliate, palea as long as the gl. ovate acute keels long-ciliate, anthers glabrous connective produced, ovary broadly ovoid. Munro in Trans. Linn. Soc. xxvi. (1868) 100; Brandis For. Fl. Brit. Burm. 567; Gamble Bamb. Brit. Ind. 42, t. 39. B. capensis, Rupr. Bamb. 54, t. 13, f. 54; Steud. Syn. Gram. 330. B. Vasaria, Ham. ex Wall. Cat. n. 5025. Dendrocalamus Balcooa, Voigt Hort. Suburb. Calcutt 718.

BENGAL, from the Gogra, eastwd. to BEHAR and ASSAM.

Stems 50-70 ft., 3-6 in. diam., cospitose, branched from the base, lower branches stiff leafless; intendees 8-18 in. with a whitish ring below and a hairy one above the swollen nodes, walls thick. Stem-sheaths of two forms; lower short, broad, ciliate, top rounded; blade short triangular decurrent into short fringed auricles; upper 10-14 by 8-10 in., almost glabrous, ciliate, truncate, blade 6-8 by 3-4 in., closely hairy above, margins recurred, base rounded and decurrent as a narrow band; ligule broad toothed. Leaves 6-12 by 1-2 in., pellucidly tessellate with glands, tip twisted scabrid, margins scabrous-ciliate, nerves 7-11; sheath appressed, hairy, truncate above with a narrow callus, bristly or not; ligule broadly triangular, membranous. Panicle compound, rachis pubescent or scurfy, swollen above; palea obscurely nerved. Lodicules 3, ovate or obovate, fimbriate. Anthers glabious, pointed. Stigmas 3, long.

- Sect. II. Arborescent or shrubby. Stems not spinous. Spikelets flattened, fig. gls. few or many. Lodicules 2-3.
- 10\*. B. VULGARIS, Schrad. in Wendl. Collect. ii. 26, t. 47; nodes with a hairy ring, leaves linear-lanceolate petioled glabrous tessellate by pellucid glands, sheath laxly hairy, callus smooth, auricle ciliate, ligule short, spikelets  $\frac{6}{10}$  in. in bracteate clusters of 3-10 oblong acute bifid, empty gls. 1-2 ovate acute many-nerved tip ciliate, fig. gls 6-10 larger, palea as long as the gl. keels white-ciliate, anthers obtuse hairy apiculate purple, ovary narrow hairy, style long. Roth Nov. Sp. 198 (excl. Syn.

R. & S.); Ruprecht in Mem. Acad. Petersb. Ser. VI. v. (1839) 140, Bamb. 47, t. 11, f. 47; Steud. Syn. Gram. 329; Dalz. & Gibs Bomb. Fl. 299; Munro in Trans. Lann. Soc. xxvi. (1868) 106; Beddome Fl. Sylv., Forest. Man. p. cexxxii., Brandis For. Flor. 568, Kurz For. Fl. Brit. Burm. in 551, Ind. Forester, i 339; Miq. Fl. Ind. But ii. 417, Griseb. Fl. Brit. W. Ind 528; Rinère, Les Bambous, 191, i. 18, 19; Trim. Cat. Ceyl. Pl. 110; Gamble Bamb Brit. Ind. 44, t. 40. B. arundinacea, Lit. Hort. Kew Ed. II. 316; Moon Cat. Ceyl. Pl. 26 (non Willd). B. humlis, Reichb. fid. Rupr. l. c. 50. B. Sieberi, Griseb. l. c. 5. B. striata, Lodd ex Munro l. c. 121; Bot. Mag. t. 6079. B. surinamensis, Rupr. l. c. 49, t. 11, f. 49; Steud. l. c. 329. B. Thouarsii, Kunth in Journ. de Phys. (1822) 148; Rev. Gram. i. 323, t. 73, 74, Enum. Pl. i. 431, Suppl. 356, Rupr. Bamb. 48, t. 11, f. 48; Steud. l. c. 329; Nees in Linnæa, 466; Thwaites Enum. Pl. Ceyl. 375. Nastus Thouarsii, Spreng. Syst. ii. 113.

Cultivated throughout tropical INDIA and in all hot countries. (Wild in Java, Kurz).

Stems 20-50 ft., by 2-4 in. diam., rather distant, green yellow or striped, polished; nodes hardly raised, with usually a ring of brown hairs; internodes 10-18 in, walls rather thin. Stem-sheaths 6-10 in. by 7-9 in. broad, often streaked with yellow, thickly hairy above, top rounded retuse; blade 2-6 by 4 in, appressed hairy on both surfaces, base rounded decurrent with rounded falcate fimbriate auricles; ligule broad, toothed or fimbriate. Leaves 6-10 by  $\frac{2}{3}-1\frac{2}{3}$  in., pale, petioled, tip twisted scabrid, nerves 6-8; sheath loosely hairy, callus cihate, auricle rounded; ligule short, cihate. Panacle large, leafy, clusters of spikelets largest at the nodes, rachis scurfy. Lodicules 3, winged, cihate.

11. **B. Oliveriana**, Gamble Bamb. Brit. Ind. 130, t. 116, stems cospitose, leaves small linear thin, auricles unequal, panicle of drooping unilateral spikes with distant bracteate clusters of 1-3 flattened spikelets about  $\frac{1}{2}$  in. long, empty gls. 1-2 ovate-lanceolate, fig. gls. 3-4 9-nerved, rachilla long flattened, palea as long as the gl. acute tip penicillate keels glabrous, anthers obtuse, ovary elongate ovoid, style short, stigmas 2.

UPPER BURMA, Oliver, Rogers.

Stems graceful, 40-45 ft., 1-2 in. diam.; glossy green, branching from the base, internodes about 14 in. Stem-skeaths thin, pale, 8-10 in. by 4-5 broad, narrowed upwards to a mouth 2-3 in broad, glabrous; blade 4-8 in., triangular-lanceolate, cordate, sparsely hairy on both surfaces; auricles unequal long fringed, one  $\frac{1}{10-3}$  in. rounded, the other decurrent; ligule  $\frac{1}{10}$  in. broad, serrate. Leaves 4-7 by  $\frac{1}{2}$  in., petioled, glabrous, nerves 4-5 pair; sheath glabrous, callus emarginate; ligule rather long. Bracts of infl. truncate, glabrous. Palea 3-nerved between and on either side of the keels. Lodicules 3, rounded, fimbriate. Grain ovoid. Anthers striped red and yellow, then purple.

12. **B. Binghami,** Gamble Bamb. Brit. Ind. 45, t. 41; stems wiry, leaves linear or linear-lanceolate base rounded tip long twisted glabrous, panicle terminal short leafy, spikelets few in scattered fascicles about \(\frac{1}{2}\) in long, empty gls. 1-2 striate mucronate, flg. gls. 5-6 ovate acute mucronate smooth many-nerved, palea as long as the gl. or longer keels fringed with long hairs, anthers obtuse or with an apical hair, ovary elongate, style short.

LOWER BURMA; Tenasserim, Bingham.

Leaves 3-6 by  $\frac{1}{3}-\frac{2}{3}$  in., subsessile or petiole very short, smooth on both surfaces, nerves 5-6 pairs. Panicle with short rachs; joints sometimes geniculate clarate. Spikelets with distichous gls., rachilla evident broad clavate flexuous; palea conspicuous. Lodzcules rounded, long-ciliate. Grain linear-oblong, beak hairy.—Appears not to differ very greatly from the Chinese B. flexuosa, Murro.

13. **B. Kingiana**, Gamble Bamb. Brit Ind 46, t 42; leaves linear-lanceolate tessellate by pellucid glands base unequally rounded, petiole flat, sheath smooth, ligule broad toothed or fimbriate, spikelets  $\frac{1}{2}$  in. few in regularly spaced clusters ovate flattened, empty gls. 2 ovate acute margins ciliate, fl. gls 4-6 similar but larger, palea oblong keels long-ciliate, anthers penicillate, ovary stipitate broadly ovoid, style short stout.

UPPER BURMA; Katha district, Oliver.

Stems 60-70 ft, up to 4 in. diam. Leaves 10-12 by 1-2; in., tip scabrid, at first sparsely harry beneath, nerves 10-15 pairs; petiole \( \frac{1}{2} - \frac{1}{3} \) in.; sheath smooth, margins ciliate, callus broad shuning, auricle small naked; ligule unequal-sided. Panicle large, compound, rachis of spiciform branchlets flexuous, joints flattened on one side, bracts small. Spikelets puiplish, rachilla clavate flattened. Lodicules 3, long-fimbiliate. Stigmas 3.—Habit of a Dendrocalamus. Stem-sheaths not known.

Sect. III. Shrubby, not spinous. Spikelets ovate, flattened, manyfld., long-mucronate. Lodicules 0.

14 B. lineata, Munro in Trans. Linn. Soc. xxvi. (1868) 118; stems reed-like, leaves large stiff brittle ovate- to linear-lanceolate, ligule short stiffly fimbriate, infl of spikes or panicles terminating leafy branchlets and bearing bracteate clusters of often spirally twisted spikelets about \(\frac{1}{2}\) in., bracts large, empty gls 1-2 ovate long acuminate 5-7-nerved, flg. longer white-ciliate, palea narrow keels minutely ciliate, anther-tips penicillate, ovary oblong pubescent. Gamble Bumb. Brit. Ind 46, t. 43. B. Rumphiana. Kurz in Jowin As Soc. Beng. xxxix. (1870) 86, Ind. Forester, 1 341. B. Amahussana. B. atra, B. picta, B. prava, Lindl. in Penny Cyclop. iii. (1835) 357. Leleba Rumphiana, Kurz in Cat. Hort. Bogor (1866) 20. L. lineata, Rumph. Herb. Amb. vi. 5, t. 1.

Andaman Islds, Pram, in marshy coast forests—Distrib. Malay Archipelago. Stems short, always flowering, \(\frac{1}{2}-1\) in. diam, green or striped with yellow, young much branched, sparsely bristly; nodes ringed by the bases of the fallen sheaths; internodes 16-24 in., rough. Stem-sheaths about 6 by 3-4 in., truncate, young strigose with golden hairs; blade usually as long as the sheath, ovate, cuspidate, elect, many-nerved, base rounded then dilating into a hairy long ciliate band on the sheath. Leaves very variable, up to 15 by 3 in. on the shoots, shorter on the branches, dull green, pale beneath, tessellate by pellucid glands, tips and margins scabrid, nerves 8-12; sheath hairy, keeled, truncate, callus minute or 0; auricles long, falcate, bristly, deciduous; ligule stiffly fimbriate. Spikelets sessile; bracts truncate; rachilla short, glabrous. Stigmas 3.—A very remarkable species with Bromus-like spikelets. Kurz ennmerates 5 varieties in the "Indian Forester." (B. atra is its earliest name.—J. D H.)

Sect. IV. Arborescent, not spinous. Spikelets cylindric, few-fld. Lodicules 0-3.

15. **B. schizostachyoides**, Kurz ex Gamble Bamb. Brit. Ind. 48, t. 44; leaves lanceolate to linear-lanceolate, sheath at first hispid truncate, callus 0, auricle falcate bearing long twisted stiff bristles, ligule long, panicle terminal spiciform, spikelets about \(\frac{1}{2}\) in. few in bracteate clusters, empty gls. 1-2 ovate mucronate many-nerved, flg. gls. 2-3 longer rough above, palea narrow keels ciliate, anthers long-apiculate, ovary ellipticoblong, style long. Cephalostachyum schizostachyodes, Kurz For. Fl. Burm. 565. Melocanna? Kurzii, Munro in Trans. Linn. Soc. xxvi. (1868) 134. Teinostachyum schizostachyoides, Kurz in Journ. As Soc. Beng. xxxix. (1870) 11. 89.

SOUTH ANDAMAN ISLDS., Kurz.

Stems tutted, 20-30 ft. by 3-4 in diam., green, glossy, nodes not thickened; internodes 1½-2 ft, walls thin; branches 1-4 from each node, leafy below, flowering above. Leaves 4-7 by 1-1½ in., tip twisted scabrous, glubrous and pule beneath, nerves 5-6. Bracts of infi., narrow, truncate or acuminate, smooth, rachis pubescent, joints about I in. Falea membranous, acuminate, dorsally 3-nerved. Lodicules if present lanceolate, ciliate. Anthers purple, cells unequal. Ovary narrowed into the style. Grain obliquely oblong, smooth, beak long stiff—Stem-sheaths not known. Remarkable for the narrow membranous acuminate palea.

Sect. V. Subscandent, not spinous. Spikelets cylindric, fl. gl. solitary.

16 **B. Griffithiana**, Munro in Trans. Linn. Soc. xxvi. (1868) 99; leaves large lanceolate glaucous beneath base unequal cuneate tessellare by pellucid glands, sheath glabrous keeled callus narrow, auricles falcate reflexed strongly bristly, ligule elongate ciliate, spikelets about  $\frac{1}{2}$  in. in distant heads on a hollow soft rachis ovate-lanceolate acute, empty gls. 2 ovate acute many-nerved, flg. gl. larger mucronate, palea membranous acute keels glabrous, anthers obtuse tip 2-fid, ovary ovoid glabrous. Gamble Bamb Brit. Ind. 49, t. 45. Dendrocalamus Griffithianus, Kurz For. Fl. Bit. Burm. ii 562.—Bambusa, Griff Journ. 90.

UPPER BURMA; banks of Mogaung River, Griffith.

Stems soft, slender, hollow Leaves 1-1½ by 2-3 in., tip subulate, twisted, scabild, nerves 13-17, petiole ½ in, stout; auricles of sheath up to ½ in., bristles long; ligule obtuse or triangular, often cleft. Panucle terminal, of spiciform branches bearing heads at intervals of 1-4 in. Spikelets cylindric; flg gl convolute; rachilla glabrous, clavate, much shorter than its imperfect terminal gl.; palea many-nerved. Lodicules 3, long-fimbriate, one much smaller. Style very short, stigmas long, plumose.

17. **B. Wrayi**, Stapf in Kew Bulletin, 1893, 14, in Hook. Ic. Pl. t. 2253, stems decurved, leaves linear-lanceolate narrowly acuminate, auricles of sheath small, ligule short truncate bristles long, panicle large leafy, spikelets in short bracteate spikes, within each bract is a keeled bracteole, then 2 imperfect spikelets in the axils of lanceolate glabrous gls. each subtended by a 2-keeled ciliate scale, fertile spikelet with ovate-lanceolate acute many-nerved, gls. keels of palea rough or faintly-ciliate, anthers obtuse glabrous, ovary ovoid glabrous. Gamble Bamb. Brit. Ind. 50, t. 46.

MALAY PENINSULA; Perak, alt. 4500-5500 ft., Wray.

Stems 40-60 ft, 1 m. diam., semiscandent, tips decurved to the ground, yellow, glabrous, shining, 3rd or 4th lower internodes up to 7 ft. Leaves 8-10 by 1 in., glabrous, petiole short narrow, neives 7-8; sheath pale, glabrous, callus shining; hairs of ligule up to ½ in. Paniele large, leafy, clusters of spikelets at the nodes or in spiciform branches, rachis smooth. Empty gl. convolute, rachilla as long as its imperfect terminal gl. Lodicules narrow, minutely ciliate. Ovary narrowed into a very short style, stigmas long, plumose. Grain oblong, beak cylindric.

Sect. VI. Arborescent, spinous.

18. **B. Blumeana**, Schult. f. Syst. vii. 1343; stem-sheaths short, leaves fascicled linear-lanceolate sheath appressed hairy, ligule fimbriate, clusters of many imperfect and few perfect spikelets, perfect spikelets and the self-spikelets, perfect spikelets, perfect spikelets, fig. gl. ovate acuments 7-8-nerved, palea broad obtuse concave keels ciliate, anthers obtuse, ovary ovoid, style very short. Kunth Enum.

Pl.i. 431; Munro in Trans. Linn. Soc. xxvi. (1868) 101; Kurz Ind. Forester, i. 340, Gamble Bamb. Brit. Ind. 50, t. 47. B. spinosa, Blume ex Nees in Bot. Zert. (1825) 580. Ischurochloa spinosa, Büse in Miq. Pl. Jungh. 389. Schizostachyum Durie, Rupr Bamb. 46.

MALAY PENINSULA; Pahang, Ridley .- DISTRIB. Malay Islds.

Stems 30-60 ft. or more, 3-4 in. diam., hard, smooth, glossy, nodes not prominent, walls thick; branches many, yellowish, copously armed; spines short ternate, recurved. Stem-sheaths 5-6 by 3-4 in. broad, narrowed to a broad convex mouth, thick, coriaceous, hispid with stiff tawny bristles, young striped violet-brown and yellow; blade nearly as broad as the sheath, triangular, cuspidate, convolute, sides covered with tawny bristles, decurrent as a broad band ending in a rounded auricle, both lined with long stiff bent bristles; ligule narrow, toothed, long-fimbriate. Leaves 3-6 by  $\frac{1}{3}-\frac{1}{2}$  in., glabrous, base rounded, tip twisted scabrous, glaucous beneath, nerves 5-7; sheath appressed hairy, callus recurved ciliate, mouth sparsely bristly; ligule truncate, fimbriate. Panicle large, terminal, branches spiciform. Lodicules 3, long-ciliate. Grain obovoid, shining above, tipped with the three stigmas.

19. B. arundinacea, Willd. Sp. Pl. 245; stem-sheaths long blade with felted hairs within, leaves linear or linear-lanceolate glabrous or slightly pubescent beneath, ligule short, spikelets 1-1 in. sessile lanceolate acute, empty gls. 0-2 ovate-lanceolate acute or mucronate many-nerved, fl. gls. 3-7 like the empty lower bisex all upper male with 2 or 3 uppermost imperfect, keels of palea ciliate, anthers yellow obtuse, ovary elliptic-oblong style short. Retz Obs v. 24 (Bambos); Roxb. Cor Pl. 1. 56, t. 79, Fl. Ind. ii. 191; Poir. Encycl. viii. 701, Kunth Enum. Pl. i. 431; Rupr. Bamb. 51, t. 13, f. 50, Grah. Cat. Bomb. Pl. 239; Dalz. & Gibs. Bomb Fl. 299: Munro in Trans. Linn. Soc. xxvi. (1868) 103, Brand. For. Fl. 564; Beddome Fl. Sylv. t. ccxxi, Forest. Man. p. ccxxxi., Kurz For. Fl. Brit. Burm. 11. 554; Thw. Enum. Pl. Zeyl 375; Trim Cat Ceyl. Pl. 110; Wall. Cat. n. 5023 A; Duthie Fodd Grass. N. Ind. 70; Gamble Bamb. Brit. Ind. 51, t. 48. B. Arondo, Klein ex Nees in Linnea, ix. (1834) 471; Rupr. Bamb. 53, t. 13, f. 53; Wight ex Steud. Nom. Ed. II. i 183. B. Neesiana. Arn. ex Munro l. c. B. orientalis, Nees l. c. 475; Rupr. l c. 52, t 13, f. 51; Munro l. c. 105; Beddome l. c. p. ccxxxi. B. pungens, Blanco Fl. Filip. Ed. I. 270. B. spinosa, Roxb. Fl. Ind. ii. 198; Ham. in Trans. Linn. Soc. xni. (1822) 480; Wall. Cat. n. 5024; Nees l.c; Rupr. l.c. 52, t. 12, f. 52, t. 13, f. 52; Munro l. c. 104; Beddome l. c.; Brandis l. c. 566; Steud Syn. Gram. 329; Benth. Fl. Hongk. 434. Arundo Bambos, Linn. Sp. Pl. 81. 'Ily,' Rheede Hort Malab. 1. t. 16.

Throughout the Plains and low hills of INDIA and CEYLON, wild and cultivated. (Cultivated only in the lower Himalaya and in the valleys of the Ganges and Indus.)

Stems from a stout rootstock, 80-100 ft. and 6-7 in. diam., graceful and curving (or short and thickly branched), branched from the base; nodes prominent, lower with long horizontal shoots armed with 2-3 recurved spines; internodes up to 18 in., often subangular, the smaller flattened on one side, walls 1-2 in. thick. Stemsheaths 12-15 by 9-12 in., coriaceous, young orange-yellow often striped green or red, top rounded, edges plaited, young thickly clothed with golden hairs; blade triangular, up to 4 in., acuminate, concave, glabrous without, matted within with dark bristles; margins involute, decurrent on the sheath, wavy, long and thickly ciliate, hardly auricled; ligule narrow, entire, or fringed with white hairs. Leaves up to 8 by 1 in., tip sharp stiff, base rounded ciliate, subtessellate by pellucid glands; sheath glabrous or nearly so, callus thick ciliate, auricle short. Pancle enormous, often occupying the whole stem; rachis usually stiff, shining, sometimes soft and angular. Lodicules 3, small, fimbriate. Anthers sometimes apiculate. - Flowers gregariously and in small clumps. The following species of most authors are here The two first scarcely differ, the last seems more nearly a separate species and the remarkable rachis justifies its admission as a variety. - Further B. arundinacea shows two distinct varieties of habit, a tall handsome large stemmed one of the valleys of the Circais and hills of S. India (often cult. elsewhere), and an almost dwarf gregarious thick branched very thorny small-stemmed one 20 ft. high (probably Royburgh's B. spinosa) which grows gregariously in the low hills and laterite downs of Orissa, Ganjam, Lower Bengal and Burma.

B. ARUNDINACEA; tachis of infl very glabious shining hard, spikelets few long

6-12-fld , rachilla evident hirsute, leaves smooth, sheath hairy.

B. spinosa, rachis striate hard not shining, spikelets many shorter 4-6-fld., rachilla obscure, leaves glabrous above harry beneath, sheath harry, then subglabrous. B. ORIENTALIS; rachis glaucous green angled almost soft, spikelets membranous

5-8-fld., leat-sheath hairy with white cilia, petiole hairy.

B. Species of which the flowers are unknown.

20. B. auriculata, Kurz in Journ As. Soc. Beng xxxix. (1870) 86; coespitose, stem-sheaths strigose on the back, leaves lanceolate tessellate by pellucid glands, sheath smooth polished, auricle naked shining. Gamble Bamb. Brit. Ind 55, t 49. Gigantochloa auriculata, Kurz For. Fl Brit. Burn. 11 557.

ASSAM, SYLHET, CHITTAGONG & BURMA, Mann, Kurz, &c.

- Evergreen. Stems 40-50 ft, 2-21 m diam., glossy, old yellow, young sourfy, branches decuived, nodes hardly thickened; internodes 18-30 m, lower shorter, walls thick. Stem-sheaths 10-12 in. by 9-10 in., base broad, convexly truncate where 4 in. broad, blade 6-9 in, triangular, acute, base slightly rounded decurrent and forming a rounded auricle; blade and sheath densely strigose except along the middle; lignle sharply toothed. Leaves 8-16 by 1-2½ in , petiole  $\frac{1}{10}$ - $\frac{1}{3}$  in , point twisted scabild, nerves 8-12, shining; callus of sheath smooth; auticle thick, rounded, glossy -Referred by Munro to B. sulgaris, but very distinct, and easily recognizable by the two harry patches on the stem-sheath, and the thin blade.
- 21. B. villosula, Kurz For Fl Brit Burm ii. 553; stems solitary, stem-sheaths glabrous truncate ciliate blade 0, leaves linear glaucescent beneath tessellate by pellucid glands, callus of sheath shining, auricle solitary long-fringed Gamble Bamb Brit. Ind. 56.

MARTABAN & UPPER TENASSERIM, on limestone hills, Brandis.

- Stems about 3 m. dum., nodes hardly raised, internodes 12-15 in. Leaves 5-8 by \(\frac{1}{2}\)-\(\frac{1}{4}\) in., tip cuspidate setaceous twisted scabrid, nerves 6-12 inconspicuous; sheath minutely villous, then glabrescent, margins whitish-ciliate; liqule short.
- 22. B. Mastersii, Munro in Trans. Linn. Soc. xxvi. (1868) 113; stem scandent reed-like, leaves oblong-lanceolate narrowed into a glandular (wrinkled?) often bairy petiole tessellate by oblique pellucid glands, tip beaked acuminate harry, callus of sheath narrow, auricles with long stiff folded bristles. Gamble Bamb. Brit. Ind. 56.

Assam; at Dibrugarh, Masters.

- Leaves 10-13 by about 11 in., base yellowish, glaucescent beneath, costa yellowish shining, nerves 10-12 pairs; sheath striate, margins ciliate, sides appressed-bristly; ligale very short.
- 23. B. marginata, Munro in Trans. Linn. Soc. xxvi. (1868) 114; stems tall scandent dark-colrd. fistular, branches deflexed, branchlets bracteate geniculate, lower internodes hirsute, leaves oblong-lanceolate margins towards the setaceously acuminate tip shaggy with thick silky

hairs, callus ciliate, ligule truncate toothed hairy outside. Gamble Bamb. Brit. Ind. 57.

TENASSERIM; top of Daunat range, alt. 5000 ft., Brandis.

Leaves 6-7 by  $1-1\frac{1}{4}$  in., glabrous, base rounded, petiole  $\frac{1}{10}-\frac{1}{8}$  in., costa vellowish, nerves 4-7 pairs, pellucid glands few; sheath striate, keeled, glabrous.—Perhaps a Dinochlou.

#### UNDETERMINABLE SPECIES.

B. ARISTATA, Lodd. ex Lindl. in Penny Cyclop. iii. 357

#### 135. THYRSOSTACHYS, Gamble.

Arborescent erect bamboos. Stem-sheaths elongate, thin, persistent; blade long, narrow Leaves small or moderate sized. Panicle compound. Spikelets prominently bracteate, loose, pile, 2-3-fid., upper gl. fertile, terminal rudimentary on a produced rachilla; empty gls. 1-2, striate; flg. similar, palea of lower gl. 2-cleft, lobes caudiform, keels ciliate, of upper entire, elongate, not keeled; rachilla harry. Lodicules 0-3, long-acuminate. Stamens 6, authers mucronate. Ovary depressed-tuibinate, style long, stigmas 2-3 feathery. Grain cylindric, long-beaked, glabious, top shining, side grooved; pericarp crustaceous, adherent to the seed.

1. **T. Oliveri**, Gamble Bamb. Brit. Ind. 58, t 50; stem-sheaths transversely truncate not auricled blade, long subulate, leaves long linear-lanceolate, panicle thyrsoid curved, spikelets ½-1 in., empty gls 2 ovate acute spursely hany many-nerved, nerves trabeculate, fig. gls. similar, palea 3-5-nerved harry between the keels.

UPPER BURMA, alt 2000 ft., in moist forests, Oliver; Shan Hills, Abdul Huk.

Cospitose. Stems straight from a stout rootstock, 50-80 ft. by 1-2½ in. diam., bright green, young silkily-downy old dull green or yellowish, nodes thickened; internodes 16-24 in, walls rather thm. Stem-sheaths persistent, shorter than the internodes, green to orange and brown, dorsally thickly pubescent, margins clinte, not auricled; blade 8-9 by ½ in., recurred, hairy above; ligule serrate. Leaves 7-8 by  $\frac{1}{2}-\frac{2}{3}$  in., roughish, base rounded, hairy beneath, nerves 6 pairs, pellucid glands irregular; sheath hairy, keeled; callus glabrous or hairy. Thyrsus bracteate at the nodes; rachis flexuous, hairy, top swollen; bracts  $\frac{1}{2}-\frac{2}{3}$  in., narrow, obtuse, sometimes folinferous. Spikelets long and short, rachilla hairy. Lodicules 2, lanceolate, ciliate. Filaments purple, anthers yellow, connective obtuse. Ocary depressed turbinate, pedicelled, yellow, stigmas 3

2. T. siamensis, Gamble Bamb. Brit. Ind. 59, t. 51; deciduous, stem-sheaths waved and truncate at top, auricles short triangular, blade narrowly triangular, leaves small narrow linear, paniele large, spikelets pedicelled fertile and sterile mixed, empty gl. solitary ovate acute 8-nerved base white-pubescent, fig. gls. 3 larger uppermost alone fruiting base and tip pubescent 14-16-nerved. Bambusa 1egia, Thoms. ex Munro in Trans. Linn. Soc. xxvi. (1868) 116 (non Kurz). B. stamensis, Kurz mss.

BURMA, from Mandalay to Tenasserim, Brandis, Oliver .- DISTRIB. Siam.

Stems coespitose, very graceful, 25-30 ft.,  $1\frac{1}{2}$ -3 in. diam., branching towards the top only, branches after flowering often producing small-leaved tufts of wiry branchlets; nodes not prominent; internodes 8-11 in., with a white ring below the nodes. Stem-sheaths very persistent, 9-11 by  $4\frac{1}{2}$ -8 in., thin, soft, white-pubescent; blade

4-5 in., margins recurved; ligule narrow, glabrous, ciliate. Leaves 3-6 by  $\frac{1}{3}-\frac{1}{2}$  in., glabrous or young puberulous, tips short twisted, costa narrow, nerves 3-5 pairs; sheath white pubescent and ciliate, truncate, callus glabrous; ligule short, ciliate. Panicle graceful, pale; branchlets many, thm, bearing bracteate clusters of few fertile spikelets mixed with sterile; bracts cymbiform, glabrous, tip truncate; rachis fine, wiry, curved, smooth, clavate. Spikelets whitish. Palea of upper fl. gl. longer than the gl., not keeled, concave, striate, glabrous, 2-mucronate, narrowed into a beak. Lodicules 0. Ovary at first ovoid, then depressed, flattened; style glabrous.

#### 136. GIGANTOCHLOA, Kurz.

Arborescent or scandent. Stems unbranched below. Stem-sheaths usually stiff, hairy above, auricled. Leaves long. Panicle compound, branches long spiciform, bearing heads of few usually fertile and sterile spikelets. Empty gls. 2-3; fl gls. similar. Palea of all the fl. 2-keeled, keels ciliate. Lodicules 1-3 or 0. Stamens 6, filaments connate into a short thick at length elongate membranous tube. Ovary hairy, stigmas 1-3 hairy. Grain usually oblong or linear and furrowed, pericarp membranous. Species about 11, chiefly Malayan.

- \* Spikelets oblong or ovoid, rounded, or flattened in G. Scortechinii.
- 1. G. verticillata, Munro in Trans. Linn. Soc. xxvi. (1868) 124; spikelets 2-4-fld.  $\frac{3}{10}$   $\frac{1}{10}$  in. ovate subacute glabrous, empty gls. 2-3 broadly ovate ciliolate, fig. gls. 3-4 similar many-nerved mucronate. Gamble Bamb. Brit Ind. 61, t. 52. G. maxima, Kurz in Tidschr. Ned. Ind. xxvii. (1864) 226, Ind. Forester, i. 343. Bambusa verticillata, Willd. Sp Pl. ii. 245. B. pseudarundinacea, Steud. Syn. Gram. 330.

MALAY PENINSULA, wild and cultivated .- DISTRIB Malay Archipelago.

Stems tufted, 80-100 ft., 4-5 in. diam., young striped yellow, mealy and with appressed brown deciduous bristles; old gray-green; nodes hairy, not prominent; internodes 18 in., walls rather thin. Stem-sheaths 12 in. long, as broad or broader, rounded to the mouth with rounded ciliate auricles, clothed without with golden brown hairs, glabrous and shining within; blade short, recurved, ovate, acuminate, narrowly decurrent; ligule narrow. Leaves 10-15 by 1\frac{1}{2}-2\frac{1}{2}, base narrowed, top setaceous twisted scabrid, young hairy beneath, nerves 8-12; sheath truncate, young hairy, callus narrow, auricle short glabrous; ligule minute. Rachis and branchlets glabrous, smooth, slender. Palea of fig. gl. shorter than the gl. sometimes 2-mucronate, 3-5-nerved, ciliate on and between the keels. Lodicules variable. Anthers yellow. Ovary suborbicular, very hairy; style pubescent, stigmas 2-3.

2. **G. Scortechini**, Gamble Bamb. Brit Ind. 62, t. 53; spikelets trimorphous larger fertile, medium rigid, small sterile, fertile spikelet  $\frac{7}{10} - \frac{9}{10}$  in. ovate acute flattened densely clothed with silvery grey hairs, empty gls. 2-3 ovate mucronate, fl. gls. longer.

MALAY PENINSULA, Scortechini, &c., alt. 400-600 ft.

Gregarious, forming forests. Stems 40-80 ft., 4-6 in. diam. Leaves linear-lanceolate, 12-16 by 1-1½ in., often unequal sided, base narrowed, tip acuminate twisted scabrid, softly hairy beneath, tessellate by pellucid glands; sheath densely pubescent, callus pubescent; auricle small, rounded, fringed with bristles; ligule short, hairy. Panicle compound, of curved spiciform branchlets bearing whorls of distichous heads 1-2 in. apart. Spikelets 2-5 fertile in each head mixed with sterile, rachis pubescent; uppermost fig. gl. convolute; palea shorter than the gl., 6-nerved

between the 2 ciliate keels, top 2-fid. Lodicules 0. Anthers yellow, long-apiculate. Ovary rounded, style glabrous. Grain obtuse, glabrous.

- \*\* Spikelets narrow, cylindric, acute.
- † Leaf-liqule short.
- 3. **G. macrostachya**, Kurz For. Fl. Burm. ii. 557; nodes hairy, leaves lanceolate whitish and softly puberulous beneath, spikelets 1-2 in linear-subulate, gls. fringed with black hairs, empty gls. 2-3 ovate mucronate dorsally many-nerved with a few bristles, flg. gls. 2-3 longer linear-lanceolate convolute, palea very narrow keels white-ciliate dorsally 3-5-nerved. Gamble Bamb. Brit. Ind. 63, t. 54.

Assam; Garrow Hills, Mann Chittagong, Arracan, & Burma, Kurz, &c. Evergreen. Stems 30-50 ft, 2}-4 in. diam, fistular, young glaucous, old dark green, sometimes striped; nodes scarcely thickened; internodes 16-30 in, lower shorter, walls \$\frac{1}{10}-\frac{1}{10}\$ in. thick Stem-sheaths 5-8 in. long, up to 14 broad, top truncate, densely covered with blackish hairs; blade as long or shorter, reniform, acute, appressed hairy beneath, base rounded dilated into a long-fringed band \$\frac{1}{2}-1\$ in. broad with rounded arricles; ligule narrow. Leaves thin, lanceolate, 6-15 by \$\frac{1}{2}-2\$ in., tip setaceous scabrid, margins scabrous, midrib narrow, nerves 5-13; sheath hairy, at length glabrous, callus rounded, auricles 1 or 2 ciliate; ligule short. Panicle large, leaty, branchlets spicate; spikelets 1-2 in., clustered, fertile and sterile Lodicules O. Anthers purple, tips setaceous. Ovary ellipsoid, style long curved hairy, stigma undivided. Grain linear, puberulous above.—The leaves resemble Bamb. Tulda; the sheaths B. nutans and teres; the spikelets Oxytemanthera nigro-culiata.

4. **G. Wrayi**, Gamble Bamb. Brit. Ind. 64, t. 55; branchlets scurfy glaucous, leaves large oblong-lanceolate cuspidate shortly petioled strigose beneath, spikelets \(\frac{3}{4}\) in conical acute, gls. fringed with black hairs, empty gls. 2-3 ovate mucronate striate, fig. gls. 3-4 longer narrower, palea narrowly oblanceolate keels faintly ciliate 5-7-nerved.

MALAYA; Perak, at Bakit Gantang, L. Wray.

Stems 3 in. diam. Leaves 12-15 by 2-2½ in., tip setaceous, scabrous, midrib broad yellow, nerves 10-12 pairs, nervules of pellucid glands; sheath smooth, keeled, mouth and short auricle fringed with long stiff white bristles, callus narrow; ligule short, puberulous. Panicle compound, branchlets spicitorm, fertile spikelets tew, sterile shortly bracetate, rachis curved. Spikelets subcompressed; empty gls. 2-3, fig. gls. narrower. Lodicules 0. Anthers long, narrow, tips elongate setaceous hairy. Ovary hairy, style slender pubescent, stigma broadly plumose.

5. **G. Kurzii,** Gamble Bamb. Brit. Ind. 65, t. 56; leaves linear-lanceolate base cuneate petioled sparsely hairy beneath, spikelets  $\frac{1}{2}$  in. acute, gls. fringed with brown hairs, empty gls. 2-3 ovate mucronate many-nerved, flg. gls. 2-3 longer narrower terminal imperfect, palea linear obtuse 3-5-nerved keels ciliate.

TENASSERIM, Kurz. PERAK, Ridley.

Stem-sheaths 6 by 3 m., cylindric, truncate, glabrous; blade longer, recurved, lanceolate, decurrent in a narrow black band lining the top of the sheath, ending in a naked round auricle. Leaves 8-13 by \(\frac{1}{2}\)-1\(\frac{1}{2}\) in., petiole \(\frac{1}{6}\) in., midrib narrow, nerves 9-11 pairs; young sheath appressed hairy, truncate, auricles rounded; ligule short. Panicle leafy, branchlets spicate. Spikelets 2-3 in. in heads with narrow bracts. Anthers obtuse, apiculate. Ovary stipitate, puberulous, style long, stigma plumose. Grain (young) glabrous.

6. **G. heterostachya**, Munro in Trans Linn. Soc. xxvi. (1868) 125; subscandent, leaves linear-lanceolate base rounded shortly petioled tip setaceous twisted scabrous sparsely harry on the midrib beneath, spikelets dimorphic sterile  $\frac{1}{2}$  in., fig. 1-1½ in oblong compressed, empty gls. 1-3 ovate glabious, fig. gls. 4-5 with 1-2 imperfect convolute, palea short obtuse 4-8-nerved keels ciliate. Kurz Ind Forester, i. 345; Gamble Bamb. Brit. Ind. 66, t. 57. Bambusa hetirostachya, Munro in Herb. Trin. Coll. Dublin, fide Munro 1 c. 126

MALAY PENINSULA; near Ayer Punas, about houses, Griffith.

Stems 30 ft., graceful, thun-walled. Leaves 4-11 by \(\frac{1}{2}\)-1 in., midrib narrow shining, nerves 6-8; sheath striate, auricle and callus rounded glabrous; ligule long, toothed, sometimes long-ciliate. Panicle large, leafy, branches spiciform, heads of spikelets \(\frac{1}{2}\)-4 in. apart, in the axils of chaffy glabrous bracts, tachis smooth, upper joints puberulous; fly. spikelets sometimes solitary, empty gls. with sometimes an imperfect fl. Lodu ules 2 (or 3?) ovate or oblong, long-fimbilate. Anthers nearly \(\frac{1}{2}\) in., tip apiculate penicillate. Ovary ellipsoid, very hairy; style often curved, hairy; stigmas 2-3, plumose.

7. **G.** ligulata, Gamble Bamb Brit. Ind. 67, t. 58; leaves large oblong-lanceolate base wrinkled unequal narrowed into a flat petiole, tip acuminate with reflexed margins scabrous, ligule long 2-fid, spikelets  $\frac{1}{2} - \frac{3}{4}$  in., conical acuminate, gls. ciliate with brown hairs, empty gls. 2-4 ovate acute mucronate many-nerved, fig. gls. longer, palea short 5-nerved keels long-ciliate.

MALAY PENINSULA; Perak, Wray; Pahang, Ridley.

Leaves 12-16 by 2-3 in, beneath pole and smooth except the scabrid tip, midrib broad yellow beneath, nerves 12-14 pairs, cross-nervules of pellucid glands; sheaths smooth, shiming, brown, striate; callus rounded, shiming, often ciliate; ligule up to 1 in, glabrous, lobes long-acuminate, membranous Paniele terminal, long, of spiciform branchlets bearing distant heads on leafy branches, each with 5-8 fertile spikelets in the axils of long yellow glabrous bracts \(\frac{1}{2}\)-1\(\frac{1}{2}\) in, long, mouth of bracts truncate, furnished with round dark naked auricles and long fimbriate ligules, rachis fistular, glaucous, lower joints 3 in. Lodicules 0. Anthers long-apiculate, tip hairy. Otary long-stipitate, depressed ovoid, shining, hury, style slender, stigma short plumose.

8. **G. latispiculata**, Gamble Bamb. Brit Ind 67, t. 59; leaves broadly lanceolate petioled base cuneate glabrous except the scabrid tips, ligule broad cleft, spikelets over 1 in., nearly glabrous, empty gls. 2-3, lower foliferous ovate-lanceolate mucronate, fl gls. 7-9 ovate-lanceolate long-acuminate harry within margins faintly ciliate, palea shorter obtuse 7-nerved keels ciliate.

MALACCA, Alwis.

Stems 50 ft. Leaves 12-14 by 1-14 m., pale, midrib prominent shining, nerves 8-9 pairs obscure; sheath smooth, glabrous, keeled, callus narrow. Panicle terminal, of spiciform branchlets bearing distinct heads 1-3 in apart, of 1-4 very large flattened spikelets 4-4 in broad, rachis smooth striate; bracts very small. Lodicules small, obovate, 3-5-nerved, fimbriate. Authers narrow, tips apiculate, penicillate. Ovary narrowly ovoid, pubescent, style slender, stigmas 3 plumose.

#### 137. OXYTENANTHERA, Munro.

Arborescent or scandent unarmed Bamboos, with a stout usually creeping and stoloniferous rootstock. Stem-sheaths various. Leaves large or small, shortly petioled. Panicle large, branches with few or many heads of whorled or capitate spikelets. Spikelets elongate, cylindric or

conical, 1-3-fid., terminal fi. usually fertile, empty gls. 1-3; fi. gls. elongate, mucronate. Palea of lower fis. 2-keeled, of uppermost convolute keel 0 or obscure. Lodicules 0. Stamens as in Gigantochloa. Ovary ovoid, style slender, stigmas 1-3 more or less plumose. Grain elongate, beaked, smooth — Species the following and a tropical African.

- \* Heads usually of few spikelets (Burmese and Malay species)
- 1. O. nigrociliata, Munro in Trans. Linn. Soc. xxvi. (1868) 228, auricles of stem-sheaths naked, spikelets 1 in., gls. fringed with black or purple cilia many-nerved, empty gls 2-3 ovate acute and mucronate, flg. gls. 2-3 and a terminal imperfect lanceolate acuminate long mucronate, palea narrow 2-3-nerved between the ciliate keels, anther tips elongate slender hirsutc. Beddome Fl. Sylvat., Forest. Man. p. ccxxxii.; Gamble Bamb. Brit Ind 69, t. 60 Bambusa nigrociliata, Büse in Pl Jungh 1. 389; Miquel Fl Ind Bat. iii. 410. B. Bitung, Hassk. Pl. Jav Rar 42 B. gracilis, Wall Cat. n. 5033. Gigantochloa nigro-ciliata, Kurz Ind. Forest. 1. 345. G. andamanica, Kurz For. Fl Burma, ii. 566

ORISSA, CHITTAGONG, BURMA, the MALAY PENINSULA, and the ANDAMAN

ISLDS. ? GARROW HILLS .- DISTRIB. Sumatra, Java.

Stem 30-40 ft. by ½-2 in. diam., sometimes striped with yellow, internodes scabrous. Stem-sheaths about 6 in., margins ciliate, narrowed to the truncate tip, doisally stigose; blade ovate-lanceolate, decurrent, auricle bright green, rounded, naked, hairy within; ligule narrow. Leaves 6-12 by 1-2 in., lanceolate, tip subulate twisted, base unequal and rounded or narrowed, scaberulous above, pule and at first pubescent beneath, midrib prominent, nerves 9-12, glands like nervules; sheath stiff, hairy at first only, margins ciliate, auricles rounded naked; ligule narrow. Pamcle large, compressed; rachis of branches pubescent. Spikelets in distant whorls of 3-6. Authers ½-5 in, narrow, purple. Ovary pubescent. Grain linear-oblong, dorsally grooved, beak penicillate.

2. **O. albo-ciliata,** Munro in Trans. Linn. Soc. xxvi. (1868) 129; spikelets  $\frac{6}{10} - \frac{8}{10}$  in., often curved mixed with yellow chaffy white-ciliate bracts fertile and a few sterile together, gls. white-ciliate, empty gls. 1-2 ovate acute, flg. gls. elliptic acute or faintly notched many-nerved convolute 2-3 lowest male, upper 1 or 2 bisexual, anthers with long hirsute tips. Gamble Bamb. Brit. Ind. 70, t. 61. Gigantochloa albo-ciliata, Kurz For. Fl. Burma. ii. 555.

Throughout BURMA, Falconer, &c.

Stems 20-30 ft. by ½-1 in. diam., densely tufted, greyish-green, curved, nodes raised; internodes 6-15 in., hispid above, walls ½-½ in. thick. Stem-sheaths 4-8 by 6 in., tawnily strigose, then glabrous, base corraceous folded, mouth narrow ending in a slightly auricled naked band; blade lanceolate, base rounded and decurrent; ligule ½-1 in., toothed. Leaves 6-8 by ½-1 in., linear-lanceolate, tip setaceous, base rounded, shortly petioled, glabrous on both surfaces, nerves 6-8, pellucid glands like nervules; sheath smooth, striate, truncate, callus smooth; ligule rather long. Pamcle large, spreading; branches smooth, slender, with distant whorls of 10-20 spikelets. Ovary acuminate, pubescent. Grain oblong, acuminate

3. O. sinuata, Gamble Bamb. Brit. Ind. 71, t. 62; leaves large softly pubescent beneath, panicle-branches softly tomentose, spikelets sterile and tertile mixed,  $\frac{3}{10} - \frac{4}{10}$  in in small heads conical puberulous, gls. ciliate many-nerved, empty gls. 2-3 ovate mucronate, fl. gls. 2-3 longer fertile upper most convolute, lower paleæ 2-3-nerved between the ciliate keels, tip of narrow anthers slender hairy.

MALAYA; Sunjei Ulong. Johobe, Ridley (var. with glabrous spikelets).

Leaves 10-12 by 1\frac{1}{4}-1\frac{1}{2} in., oblong-lanceolate, acuminate, base rounded or subcordate, petiole broad hairy, tip setaceous scabrid twisted scaberulous above, midrib faint, nerves 10-12 pair; sheath glabrous or puberulous, keeled, striate, ending in a narrow ciliate callus; ligule rather short, thickly pubescent. Panicle with slender sinuous branches, internodes \frac{1}{2}-1\frac{1}{2} in. Ovary broadly ovoid, style hairy, stigma plumose.

4. O. parvifolia, Brandis ex Gamble Bamb. Brit. Ind. 72, t. 63; leaves 3-5 by ½ in. linear-lanceolate puberulous beneath, spikelets narrow 3-½ in. 4-10 in a whorl with polished bracts, rachis slender wiry, gls. eciliate fertile and sterile mixed, empty gls. 2-3 ovate mucronate glabrous, fl. gls. similar but longer usually 2 fertile and 1 imperfect, palea 2-3-nerved between the shortly ciliate keels, anthers short obtuse.

BURMA; in the Yônzalin Valley, Brandis.

Stems up to 3 in. diam. Stem-sheaths 8-9 by 8-10 in., strigose with brown hairs, top truncate striate; blade 2-3 by 1 in, base rounded and decurrent in a narrow naked subauricled band; ligule long, rather broad. Leaves shortly petioled, base rounded, tip subulate twisted, pale and puberulous beneath; sheath at first hairy, ending in a prominent callus bristly at the top. Panicle of long glabrous branches, with internodes 1-2 in. Spikelets glabrous; empty gls. striate towards the tip. Ovary hairy, style long slender, stigmas 1-2 plumose.

- \*\* Heads of many spikelets.—South Indian species.
- 5. **C. Thwaitesii**, Munro in Trans. Linn. Soc. xxvi. (1868) 129; stem reed-like straggling, leaves up to 8-12 by 1-1½ in., spikelets ½-½ in. in dense heads with ovate bracts acute pale usually 1-fld, rachis smooth, gls. with more or less ciliate margins, empty gls. 2-3 ovate mucronate many-nerved, fig. gl. ovate acute cuspidate pubescent above, palea convolute, auther-tips long hairy, stigmas 3 Beddome Fl. Sylv. t cccxxii.; Forest Man. p. ccxxxii.; Trim. Cat. Ceyl Pl. 110; Gamble Bamb. Brit. Ind. 73, t. 64. Dendrocalamus monadelphus, Thwaites Enum. Pl. Ceyl. 376.

NILGHIEI and TEAVANCORE HILLS, alt 3500-6000 ft. CEYLON, alt. 4-6000 ft. Stems 10-12 ft. by 1 in. diam., gregarious, straggling or subscandent, smooth; branches whip-like, branchlets whorled and sheathed, nodes prominent, internodes 12-18 in. rough, young hirsute, walls  $\frac{1}{\sqrt{10}}$  in. thick. Stem-sheaths about 6 by 3-4 in., of young shoots glabrous yellow shning, of old strigose with light brown hairs, ending in a coriaceous separable ciliate ring; blade 3-5 by 1 in, base rounded decurrent in rounded falcate auricles, pectinately ciliate with long curved bristles; ligule of old sheaths long-fimbriate, of young narrow erose. Leaves with twisted setaceous tips, sparsely hairy beneath, midrib narrow yellow, nerves 4-5 pairs, pellucid glands few; sheath otten hirsate keeled, callus rounded, young with falcate bristly auricles; ligule long. Panucle very large, leafy; lower heads  $1\frac{1}{2}-2$  in. diam., upper smaller with tewer spikelets. Ovary ovoid and style pubescent. Grain  $\frac{1}{6}$  in., glabrous, mucronate.—Easily recognized by the whip-like climbing branches and long-ciliate sheaths.

6. **O. monostigma**, Beddome Fl. Sylv. Forest. Man. p. ccxxxiii., and Ic. Pl. Ind. Or. i. 56, t. 234; stem solid velvety-tomentose pale yellow, leaves 6-8 by  $1\frac{1}{2}$  in linear-lanceolate, spikelets  $\frac{3}{4}$ -l in in globose heads fertile and sterile spinescent, glabrous, empty gls. mucronate 2-3 lower small ovate, upper ovate-lanceolate, fig. long linear-lanceolate long-nucronate convolute, palea concave not keeled obtuse, anthers tipped with a long hairy bristle, stigma 1. Gamble Bamb. Brit. Ind. 74, t. 65. Bambusa Ritcheyi,

Munro in Trans. Linn. Soc. xxvi. (1868) 113. Schizostachyum hindostanicum, Kurz in Journ. Beng. As. Soc. xlii. (1873) II. 252.

WESTERN GHATS, from the Concan to the Anamala, Hills.

Stems 10-15 ft. or more by 1 in. diam., internodes long. Stem-sheaths 6-9 by 3 in. broad at the base, narrowed from the base up to the 2-lobed tip; blade in the sinus, 3 in., linear-lanceolate; ligule long, fimbriate. Leaves variable, shortly petioled, pale green, tip setaceous twisted, base unequal rounded, sparsely hairy beneath, midrib beneath yellow shining, nerves 7-12; sheaths striate; ligule long. Panicle large, terminal, rachis smooth, heads of spikelets up to 2½ in. diam. Otary ovoid, acuminate and style glabrous, stigma thickened. Grain narrow, tipped with the conic style-base.

7. O. Stocksii, Munro in Trans. Linn. Soc. xxvi. (1868) 130; stems glabrous or softly pubescent, leaves 4-8 by  $\frac{1}{2}$   $\frac{2}{3}$  nn., spikelets  $\frac{1}{2}$  nn. in globose heads spinescent glabrous fertile and sterile, empty gls. 2 ovate mucronate 5-7-nerved, fl. gls. 2 ovate subacute dorsally mucronate, anthers short acute, stigma 1. Beddome Fl. Sylvat., Forest. Man. p. ccxxxii.; Gamble Bamb. Brit. Ind. 75, t. 66.

The CONCAN, Stocks, &c. (usually cultivated).

Stems slender, grey-green, solid, or tube slender, nodes with a softly pubescent ring; internodes 6-12 in. Stem-sheaths 6-9 in. by 3-7 at the base, tapering upwards to a retuse tip, densely brown, strigose, margins ciliate; blade subulate, base dilated into a rounded fringed auricle; ligule \(\frac{1}{2}\) in., deeply fimbriate. Leaves very shortly petioled, tip setaceous, base rounded or cuneate, beneath glabrous or hairy, midrib narrow, nerves 5-6; sheath striate; ligule rather long, toothed. Panicle large; heads 1 in. diam., mixed with chafty bracts, rachis smooth, internodes 1-2 in. Anthers short, acute. Ovary and long style hairy, stigma simple, plumose.

8. **O. Bourdilloni,** Gamble Bamb. Brit. Ind. 76, t..67; stem-sheaths conaccous nearly glabrous, leaves 6-9 by 1-1½ in., mouth of leaf-sheath with 2 shining calli, spikelets  $\frac{2}{3}-\frac{3}{4}$  in. in globose heads glabrous, rachis soft, empty gls. 2 ovate mucronate many-nerved, fl. gls. 3, mucronate lowest much longer than the next, rachilla ciliate and bearing a setaceous gl., anthers apiculate, stigmas 3, short.

TRAVANCORE; on the Ghats, alt. 3-4000 ft., Bourdillon.

Stem in open clumps of straggling habit, soft, internodes long. Stem-sheaths 6-12 by often 6 in., glabrous, except a few black bristles below, slightly narrowed upwards, tip truncate; blads 2-3 in., triangular, decurrent and forming two rounded recurved entire wings that line the upper edge of the sheath; ligule short. Leaves shortly petioled, thin, tip twisted, scabrous covered above with scabrid papillæ near the margins and midrib, smooth beneath; midrib narrow, nerves 7-8; sheath soft, striate; ligule long, serrate. Pancle large spikelets in globose heads 1½-2 in. dam., rachis fistular. Palea of lower fis. 3-nerved between the ciliate keels, rachilla ciliate with a terminal imperfect gl. Ovary and style hairy. Grain linear-oblong, tipped with the thickened style-base.

## 138. DENDROCALAMUS, Nees.

Arborescent unarmed Bamboos, with densely branching rootstocks. Leaves shortly petioled, transverse nervules represented by pellucid glands. Spikelets in globose clusters on the long branches of a compound panicle, ovate, 2-6-fld., empty gls. 2-3, ovate, acute, many-nerved, flg. gls. like the empty; palea of lower fls. keeled, of upper dorsally rounded eciliate. Lodicules 0 or rare. Stamens 6, filaments free. Ovary hairy above, often

depressed, stigma usually simple. Grain small, pericarp corraceous or crustaceous - Species 16 known.

- Sect. I. Spikelets hard, spinescent, crowded in spicate heads.—Leaves usually narrow.
- 1. D. strictus, Nees in Linnea, ix. (1834) 476; leaves up to 10 by  $1\frac{1}{1}$  in., shortly suddenly petioled softly hairy beneath, spikelets  $\frac{1}{4}$  in. harry spinescent fertile and smaller sterile mixed, empty gls. 2 or more ovate spinescent many-nerved, fig. gls ovate tip spinescent and pubescent, palea of lower 6-7-nerved between the ciliate keels, anthers apiculate. Mig Fl. Ind. Bat. 111. 421; Munro in Trans. Linn. Soc xxvi (1868) 147; Beddome Fl Sylvat. t cccxxv., Forest Man. p ccxxxv.; Brandis For. Fl. 569, t. 70, Kurz For. Flor. Burma, ii. 558, Ind. Forester, 1 346, Artchis. Cat Panjab. Pl. 171; Duthie Fodd. Grass N. Ind 71; Gamble Bamb. Brit. Ind. 78, t. 68, 69. Bambos stricta. Roxb Corom. Pl. i. 58, t. 80. Bambusa stricta, Roxb. Fl. Ind. ii 193; Kunth in Journ Phys. xlv. (1822) 148; Enum Pl i. 431; Ruprecht Bamb. 56, t. 12, f 56; Steud. Syn Gram. 330; Dal. & Gibs. Bomb. Fl 299. B. verticillata, Rottl. ex Munro l.c. B. pubescens, Lodd ex Lindl. in Penny Cyclop. iii. (1835) 357. B. Tanæa, Ham. ex Wall. Cat. n. 5038 A.—Bambusa, Wall. Cat. n. 5038

Dry hills of N. India, from Garwhal to Nepal and southward from the Panjab to BEHAR, the CONCAN, CENTRAL and S. INDIA, BURMA, and GREAT COCOS ISLD.

(Not in Ceylon.) -- DISTRIB. Java.

Stems 20-50 ft. by 1-3 in. diam, hollow in moist climates, solid in dry, young glaucous green, old yellowish, nodes swollen, lower often rooting, internodes 12-18 in, upper branches decurved. Stem-sheaths variable, lower 3-12 in., glabrous or strigose with yellow-brown hairs, striate, top rounded ciliate, slightly auricled; blade triangular, hany, especially within; ligule narrow. Leaves deciduous, narrowed from the rounded petioled base to the twisted tip, midrib prominent, nerves 3-6 pairs with interposed pellucid glands; sheath striate hairy, callus prominent, auricle short ciliate with flexuous deciduous hairs; ligule narrow, serrate. Panicle large, heads dense, 1-12 in., much smaller in S. Indian forms; rachis smooth, internodes  $1\frac{1}{2}$ -2 in. Spikelets usually hairy. Ovary stipitate, turbinate, style long, stigma simple feathery. Grain broadly ovoid, shining, beaked, hairy above.

Var. Prainiana, Gamble I c. 80, t. 69, fig. A.; spikelets smaller, fis. fewer, fi.

gls. nearly glabrous. Great Cocos Isld., Prain.

2. D. sericeus, Munro in Trans. Linn. Soc. xxvi. (1868) 148; characters of D. strictus, but spikelets silkily hairy, anther-tips obtuse. Gamble Bamb. Brit. Ind. 81, t. 70.

BEHAR, summit of Parus-nath, alt. 4000 ft., J. D. H., &c.

(I should regard this as a variety of D. structus had it not been retained by Munio & Gamble. The latter describes the empty gls. as obtuse, but they are acute in the plate referred to .- J. D. H.)

3. D. membranaceus, Munro in Trans. Linn. Soc xxvi. (1868) 149; stems scurfy when young, leaves 5-10 by  $\frac{1}{2}$  in hispid above, spikelets in., glossy nearly glabrous, empty gls. 2 orate obtuse or acute, fl. gls. 2-3 ovate mucronate glabrous margins often ciliate, anthers apiculate. Kurz For Fl. Burma, ii. 560; Gamble Bamb. Brit. Ind. 81, t. 71.

EASTERN BURMA, Wallich, &c.

Closely resembles glabrous forms of D. structus, but stem-sheaths with waved harry auricles, leaves thinner, base less rounded, grain more elongate, and grooved.

Sect. II. Spikelets in large soft congested heads. Leaves usually broad.

4. **D. sikkimensis,** Gamble in Hook. Ic. Pl. t. 1770, Bamb. Brit. Ind 82, t. 72; stem sheaths felted with golden brown hairs, leaves 6-10 by 1½-2 in. oblong-lanceolate strigosely hirsute and rough beneath, mouth of leaf-sheaths fringed, spikelets ½-3 in. in large globose red-brown heads lanceolate subobtuse glabrous, empty gls. 3-4 ovate keeled keels ciliate, fig. gls 2-3 ovate mucronate glabrous margins ciliate, authers acute. Gard. Chron. (1890), i. 792, fig 130, II 279 (1892), ii 675 cum Ic.

EASTERN HIMALAYA, Sikkim and Bhotan, alt. 4-6000 ft. GARROW HILLS, on Tura Peak, alt 3500 ft.

Stem 50-60 ft. by 5-7 in. diam, maked below, dark green, nodes ringed, internodes 18 in, rough. Stem-sheaths 12 by 15 in., top broad; blade lanceolate, recurved, harry on both surfaces, decurrent into two large falcate recurved auricles fringed with long curved pale bristles; ligule sharply seriate. Leaves variable, tip black twisted, base rounded, smooth above, midrib prominent, nerves about 10 pairs; sheath smooth, callus small ciliate, auricles fringed with stiff bristles; ligule short, fimbriate. Panscle large, branches nodose, heads of spikelets 1½ in diam, rachis dull brown puberulous, internodes about 2 in Palea of lower fl. obtuse, keels shargy many-nerved. Ovary subglobose, harry; style short, thick, and clavate stigma harry. Gravn depressed obvoid, apiculate, wrinkled below.

5. **D. Hookeri,** Munro in Trans. Linn. Soc. xxvi. (1868) 151; stemsheaths felted with black or brown hairs, leaves 10-12 by 2 in. or more oblong-lanceolate rough beneath, mouth of leaf-sheath not fringed, spikelets about  $\frac{1}{3}$  in. in large heads ovate acute puberulous, empty gls 2 ovate obtuse, flg. gls. 2-3 ovate acute many-nerved uppermost mucronate, anthers long tips penicillate. Brandis For. Flor. 570; Gamble Bamb. Brit. Ind. 84, t. 73. Bambusa globifera, Griseb. in Goett Nachr. (1868), 72.

SIKKIM HIMALAYA, Anderson, &c. ASSAM, the KHASIA, JAINTEA, and DUPHLA HILLS, alt. 2-5000 ft., J. D. H. & T. T., &c. Burma; Bhumo district, Oliver.

Stem 50-60 ft. by 4-6 in. diam., naked below, internodes 18-20 in., lower somewhat rough and hairy, walls about 1 in. thick; branches long, curving. Stemsheaths large, old very broad, younger about 16 in. by 8-12 broad at the base, top 2-3 in. broad; auxicles 2, rounded, ciliate with stiff hairs; blade 3-7 in., triangular, hairy above; ligule ½-½ in., sharply serrate Leaves oblong-lanceolate, tip long twisted hispid, base rounded very shortly petioled, midib very prominent yellow, nerves 8-16 pairs, tessellate by pellucid glands (seen when dry); sheath hairy below, shining above, truncate, sometimes sparingly hairy, callus large; ligule conspicuous, glabrous. Panicle large, internodes 2-3 in., dull grey-green, somewhat hirsute; heads of spikelets 1 in. diam.; fl. gls. with transverse nervules. Ovary ovoid, acuminate, hairy, style twisted, stigma plumose.

6. **D. Hamiltonii**, Nees & Arn. ex Munro in Trans. Linn. Soc. xxvi. (1868) 151; stem-sheaths glabrous, leaves broadly lanceolate cuspidate, spikelets nearly  $\frac{1}{2}$  in. long ovoid depressed purple glabrous, empty gls. usually 2 short rounded nerved, flg. gls. 2-4 orbicular margins culiate, anthers purple with a long black hairy twisted point. Brandis For. Fl. 570. Bambusa monogyna, Griff Notul. 63, Ic Pl Asiat. t. 2. B. maxima, Ham. ex Wall Cat n. 5039. B. Falconeri, Munro l. c. 95, in part.

TROPICAL HIMALAYA; from Garwhal (cult.?) to Sikkim, Assam, the Khasia Hills, and Silhet.

Stems up to 80 ft. by 4-7 in. diam., much branched above, young appressedly white-pubescent, nodes with root-scars; internodes 12-20 in., walls ½ in. thick.

Stem-sheaths glabrous or with patches of appressed hairs, tip truncate, auricles acute; blade lanceolate, acute, with a small glabrous triangular point on each side, often 12 in., glabrous, margin incurved, with black bristles at the base within; ligule 1/2 in., smooth, entire. Leaves variable, small on side branches, up to 15 by 2 1/2 in. in new shoots, base rounded shortly petioled, tips scabrous twisted, margin finely serrate, midrib very narrow, nerves 6-17 pairs with nervules of pellucid glands; sheaths glabrous above, below clothed with white appressed stiff hairs, subkeeled below the shining callus; ligule broad. Panicle very large, branches scabrous and white-pruinose, furrowed on one side; internodes 1 in. or less, thick, fistular, scabrid; heads hemispheric, 1-11 in. diam.; spikelets usually all fertile, surrounded with rounded scarious bracts. Ovary subglobose, hairy, style long, stigma 3-fid feathery. Grain broadly ovoid, beaked, glabrous or hairy above.

7. D. patellaris, Gamble Bamb. Brit. Ind. 86, t. 75; stem-sheaths long cylindric margins above with a broad membranous fimbriate wing, leaves 8-16 by 1-4 in. lanceolate base narrow, spikelets depressed-ovoid obtuse, gls. all orbicular cuspidate many-nerved and palea tomentose within, empty gls. 1-2 membranous, fig. 3-5, authors purple tip conical hairy. Bambusa patellaris, Kurz in Herb. Calcutt.

SIKKIM HIMALAYA; below Tonglo, alt. 4000 ft., Anderson, &c. NAGA HILLS, Mann.

Stems 20-30 ft. by 1-11 in. diam , dull green, striate, nodes with a hairy belt. internodes 12-18 in., walls thin. Stem-sheaths very persistent, 10-12 in. by 3 in. broad, sparsely strigose, glabrous within, narrowed in upper third to a truncate top, margins winged for 1-2 in ; limb 6 in., lanceolate; ligule tringed. Leaves persistent, petioled, variable, soft, tip twisted scabrid, midrib stout, nerves 8-10 pairs; sheath striate, keeled, truncate, or produced into a narrow callus, margins fringed; ligule very large, fimbriate. Panicle very large, rachis of branches rough, fistular; heads distant, distichous, 1-1 in. diam., bearing hard shining bracts many, dark brown, rachilla produced with a terminal imperfect gl. Lodicules 0 or 2, narrow, long-ciliate. Ovary ovoid, style harry, stigmas 3.

Sect. III. Spikelets few, in small heads, many sterile.

\* Spikelets long, ovate, acute.

8. D. giganteus, Munro in Trans. Linn. Soc. xxvi. (1868) 150; stem-sheaths very large nearly glabrous, leaves up to 20 by 4 in. oblong young hairy beneath, spikelets 1 in. ovoid acute spinescent puberulous, empty gls. ovate mucronate striate, fl. gls. 3-6 thin mucronate many-nerved, anthers acuminate Kurz Ind. Forester, i. 346; Gamble Bamb. Brit. Ind. 88, t. 76. Bambusa gigantea, Wall. Cat. Bot. Gard. Calc. 79; Voigt Hort. Suburb. Calc. 719.

TENASSERIM, the MALAY PENINSULA, and PENANG (cult. in Assam and elsewhere in India)

Stem's 80-100 ft. by 8-10 in. diam., branched above, nodes hairy, internodes rather short, grey-green, young with waxy scurf, walls thin. Stem-sheaths 20 in., as broad at the base, deciduous, thinly strigose with golden hairs, top depressed; blade 5-15 by 31 in., decurrent into glabrous stiff brown wavy auricles, narrowed above into a short point; ligule 2-5 in., stiff, black, margin serrate. Leaves cuspidately acuminate, tips twisted, young hairy beneath, midrib strong, nerves 12-16 pairs, with pellucid cross bars. Panicle very large, branchlets slender curved; heads up to 1 in. diam. 1-1 in. apart. Spikelets sometimes all flowering, rachilla produced with an imperfect gl. Ovary ovoid and long style hairy, stigma simple. Grain oblong, obtuse, hairy above.

9. **D.** calostachyus, Kurz For. Fl Burma, ii. 562; stem-sheaths truncate tawny-strigose, leaves 9-12 by 1-2½ in. broadly lanceolate softly hairy beneath, spikelets about ½ in. ovate acute faintly pubescent, empty gls. 2-3 broadly ovate acute many-nerved, fig. gls. 4-6 rather longer, anthers yellow mucro smooth. Gamble Bamb. Brit. Ind. 89, t. 77. Bambusa calostachya. Kurz in Journ Beng. As. Soc. xlii. (1873) 249.

UPPER BURMA; Bhame and Kachin Hills up to 3500 ft., J. Anderson.

Stems with appressed silvery hairs; nodes thickened, annulate. Stem-sheaths truncate; ligule narrow, subentire. Leaves shortly petioled, base rounded, nerves 9-18 pairs, sheaths white-ciliate, mouth truncate, callus small, ligule broad, truncate. Paniele of long whip-like curved spikes; rachis flattened on alternate sides, glaucous, subpuberulous; heads of 2-5 spikelets, bracts few small. Spikelets subcompressed; fig. gls. with conspicuous transverse nervules; palea 5-nerved and transversely nervuled between the ciliate keels and 1-nerved outside the keels. Ovary broadly ovoid, subhemispheric and long style hairy, stigma simple fringed.

10. **D. latiflorus**, Munro in Trans. Linn Soc. xxvi. (1868) 152, t. 6; leaves 7-10 by 1-2 in. broadly lanceolate long-acuminate, spikelets  $\frac{1}{2}$  in. few in a head ovate-oblong compressed, gls. many-nerved pubescent, empty gls. 2 short broad acute ciliate, fl. gls. 6-8 broadly ovate suddenly narrowed to a subobtuse point, margins dark colrd. ciliate, anthers pale tipped by a hairy mucro. Gamble Bamb. Brit. Ind. 131, t. 117. Bambusa latiflora, Kurz in Journ. As. Soc Beng. xlii. (1873) II. 250. B. verticillata, Benth. Fl. Hongk. (ex Munro).

UPPER BURMA; Southern Shan States, King's Collector.—DISTRIB. China, Formosa.

A very large Bamboo Stems tall, fistular, internodes short, 5 in. diam, cavity large, striate, glabrous. Leaves shortly petioled, glabrous, midrib prominent, nerves 9 pairs, transverse nervules many obscure; sheath sulcate, glabrous or hairy between the lines, ligule truncate. Pancele large, uppermost spikelets followed by leaf-like bracts 1-1½ in. long, rachis softly hairy, flattened on one side, white-ringed above. Ovary ovoid from a broad base and long style hairy, stigmas 1-2.

- \*\* Spikelets short, obtuse.
- 11. **D. longispathus,** Kurz For. Fl. Burma, ii. 561; stem-sheaths persistent papery strigose with patches of brown hair, leaves oblong-to linear-lanceolate narrowed to the base rough almost white beneath, spikelets  $\frac{1}{6}$  in. in small heads obtuse nearly glabrous, empty gls. 2-3 obovate obtuse, flg. gls. 2-3 obovate cucullate margins ciliate many-nerved, anthers short tip mucronate black. Gamble Bamb Brit. Ind. 89, t. 78. Bambusa longispatha, Kurz in Beng. As. Soc. Journ. xlu. (1873) II. 249

SILHET, Monn. CHITTAGONG, Lister, &c. ARRACAN, Schlich. BURMA, Brandis, &c.

Stems 60 ft., leafy above only, nodes often rooting; internodes 10-24 in. by 3-4 diam., grey-green, walls \( \frac{1}{2} \) in. thick. Stem-sheaths fragile, 15-20 by 5-7 in., sides parallel till near the depressed sometimes 1-auricled top; blade 12-18 in., lanceolate, dorsally hairy; ligule broad, serrate and often fimbriate. Leaves acuminate midrib thick yellow, nerves 8-10 pairs; sheath smooth, glabrous; ligule narrow. Panicle large, sometimes leafy, of interruptedly spicate clusters \( \frac{1}{6} - \frac{3}{6} \) in. broad, with hard polished bracts at the base. Spikelets few or many-fid. Ovary broadly ovoid, subacute; style rather short, stigma short. Grain ovoid, yellow, beaked.

12. **D. Brandisti**, Kurz For. Fl. Burma, ii. 560; stem-sheaths thickly coriaceous white-pubescent, leaves 9-12 by 1-2 in. oblong-lanceolate softly

hairy beneath. spikelets  $\frac{1}{5}$ - $\frac{1}{3}$  in. depressed ovate puberulous, empty gls. 1-2 broadly ovate mucronate, flg. gls. 2-4 similar few-nerved margins ciliate hairy below the tip, anthers short apiculate or penicillate greenish-yellow. Gamble Bamb. Brit Ind. 90, t. 79. Bambusa Brandisii, Munro in Trans. Linn. Soc. xxvi. (1868) 209

BURMA; Pegu, Martaban Hills, and Ruby-mines district, Kurz, &c.

Stems 60-100 ft. by 5-8 in diam., tufted; nodes slightly swollen, internodes ashy-grey, 12-15 in, walls thick. Stem-sheaths up to 2 ft. by 12-14 in., top depressed; blade 6-18 in, linear-lanceolate, strigose within, decurrent in small plaited auricles; ligule \(\frac{1}{2-3}\) in, lacerate. Leaves base narrowed, petiole wrinkled, midrib stout shining, nerves 10-12 with transverse pellucid glands, young sheaths pubescent, mouth with a few long cilia, callus large, glabrous. Panicle large, branches whip-like, rachis densely pubescent flattened on one side, internodes 1-15 in.; heads \(\frac{1}{2-3}\) in diam, bracteate; palea with 3-nerved side wings. Lodicules 1, 2, or 0, 3-nerved, long-ciliate. Filaments short. Ovary ellipsoid, harry, style short, stigmas 2 plumose. Grain ovoid, mucronate, harry above.—Perhaps not different specifically from D. flagellifer.

13 **D. flagellifer,** Munro in Trans Linn Soc. xxvi (1868) 150; very near D. Brandisii, but leaf-base more rounded, rachis of spikes more hairy, heads with fewer spikelets. Gamble Bamb. Brit. Ind. 91, t 80. Bambusa flagellifera, Griff mss. ? B. Bitung, Schult. Syst. vn. II. 1354.

TENASSFRIM; on Moolyet, alt. 2000 ft., Beddome. SINGAPORE, Ridley A little known species, probably only D. Brandisu.

14 **D. longifimbriatus**, Gamble Bamb. Brit. Ind. 92, t. 81; leaves 12-14 by 2-3 in. oblong acuminate, auricles of sheath long falcate stiffly ciliate with curved bristles, spikelets very small glabrous, empty gls. broadly ovate striate, fig. gls. 1-2 ovate acute keeled often mucronate, anthers short apiculate.

BURMA; in the extreme south of the Mergui district (Herb. Calcutt).

Leaves very large, base nounded unequal, petiole \(\frac{1}{2}\) in, whickled, pale and smooth beneath, midrib hairy beneath, nerves 12-18 pairs, transverse nervules of pellucid glands; sheath shining, callus narrow; ligule short, very hairy. Panicle large, branchlets solid, short, rachis slender, flevuous, glabrous; heads (young only seen) bracteate. Ovary ovoid, glabrous, style hairy, stigma plumose—An imperfectly known species, best distinguished by the falcate long-tringed auricles of the leaves.

#### IMPERFECTLY KNOWN SPECIES.

15. **D. Parishii**, Munro in Trans. Linn. Soc xxvi (1868) 149; panicle of globose interrupted dense heads, spikelets about  $\frac{1}{3}$  in. ovoid subobtuse nearly glabrous compressed, empty gls. 1-2 ovate acute many-nerved cliate, fig. gls 2-3 similar glabrous, upper mucronate tessellately nerved cliate, anther tip obtusely acute Brandis For. Fl. 570, Gamble Bamb. Brit. Ind. 93, t. 82.

The PANJAB HIMALAYA, Parish.

Flowers nearest D. Hooken (of which it is possibly a planted specimen), differing in the glabious gls. and obtusely acute anthers.

16. **D. Collettianus**, Gamble Bamb. Brit Ind. 93, t. 83; heads of spikelets  $\frac{1}{2}$ -1 in. diam. bracteate with 6-12 fertile and a few sterile fis. rachis pubescent, spikelets  $\frac{1}{2}$ - $\frac{3}{4}$  in. soft white-pubescent, empty gls. 2 ovate acute many-nerved midrib thickened, fig. gls. 2-4 and an imperfect ovate-

lanceolate shortly mucronate pubescent many-nerved, palea larger than the fig. gl., keels long-ciliate with white hairs, anthers obtusely apiculate.

UPPER BURMA; Fort Stedman, Abdul Huk. The softly white-hairy spikelets are diagnostic.

#### 139. MELOCALAMUS, Benth.

Stem semiscandent from a stout rootstock. Stem-sheaths hard, cylindric, auricled Leares large, petioled, transverse nervules 0. Panicle large. Spikelets in dense heads, very small, rachilla continuous and produced beyond the upper gl., empty gls. 2, broad, obtuse, many-nerved; flg gls. 2, bisexual but one only fertile; palea very broad, cymbiform, membranous. Lodicules 3, large, ciliate Stamens 6, filaments short, free, anthers obtuse. Ovary glabious, style short, stigmas 2-3 plumose. Grain very large, depressed-globose, pericarp tough; seed large, fleshy.

M. compactifiorus, Benth. in Journ. Linn. Soc. xix. (1881) 134: Gamble Bamb Brit. Ind. 94, t. 84. Pseudostachyum compactifiorum, Kurz For. Fl. Burm. 11. 567, Ind. Forester, i. t. II. fig. 13.

EASTERN BENGAL and BURMA; from Silhet to Arracan, Martaban, and the Ruby Mines district.

Stems 15-100 ft. by 3-1 in. diam , rough, spreading and arching over tall trees, nodes thickened; internodes grey green, 14-24 in. Stem-sheaths about 6 by 3 in., smooth or strigose, mouth diluted; blade long-acuminate, dilating into a narrow dark reflexed crescentic auricle fringed with stiff bristles, hispid towards the base; ligule narrow, entire. Leaves 6-10 by 1-2 in., oblong-lanceolate, tip subulate penicillate twisted, base rounded, petiole harry, midrib narrow, nerves 8-12 pairs, sheath streate, young strigose, mouth truncate, auricle lunate reflexed; ligule narrow. Panicle interrupted, often leafy, heads 1-1 in. diam, subglobose, rachis flexuous pubescent, laterally flattened. Spikelets 10 in., or rather more, obtuse or truncate, 2-cleft; empty gls ventricose; fl. gls. similar, often ciliate. Grain 1-13 in. diam., seated in the persistent glumes.

#### 140. PSEUDOSTACHYUM, Munro.

Shrubby, rootstock creeping. Stem-sheaths short. Leaves large, tessellately nerved. Panicle with diopping spikes. Spikelets small, solitary in the axils of narrow bracts, I-fld, rachilla produced with imperfect gls.; empty gl. usually solitary, broad, mucronate, about 7-nerved; fig. gl. similar; palea thin, convolute, 2-keeled. Lodicules 3-5, large, ciliate. Stamens 6, anthers apiculate. Ovary linear-oblong, glabrous, style long rigid, stigmas 2 hairy. Grain depressed-globose.

P. polymorphum, Munro in Trans. Linn Soc. xxvi. (1868) 142, t. 4; Gamble Bamb. Brit. Ind. 96, t. 85.

SIKKIM HIMALAYA, ASSAM, the GARROW HILLS, MUNNIPORE & BURMA,

Griffith, &c. Stems up to 50 ft, by 7-12 in. diam., arising singly from the rootstock, often subscandent, nodes hardly swollen, internodes 7-12 in by 1 in. diam., at first glaucous, walls very thin. Stem-sheaths shorter than the internodes, triangular, truncate, strigose with brown bairs, auricle very short with a tuft of stiff bristles; blade long-acuminate in young shoots, base as broad as the truncate top of the sheath; ligule short. Leaves 4-14 by 1-2 in., narrowed into the stout 1-1 in. petiole, midrib pale, nerves 7-11, nervules oblique; ligule short. Panicle large, leafy, branches fascicled, rachis wiry angled. Grain subtended by the gls. and lodicules, pericarp crustaceous.—Spikelets in diseased specimens converted into rounded softly hairy masses.

## 141. TEINOSTACHYUM, Munro.

Shrubby or arborescent; stems thin, arching. Stem-sheaths usually thin. Leaves various. Panicle spiciform, on leafy branches. Spikelets in bracteate whorls, long, narrow, many-fid., upper and lower fis. imperfect; empty gls 1-2, mucronate, fi gls. similar, nucros longer; palea convolute, keels ciliate. Lodicules 3, 3-9-nerved. Stamens 6, filaments free, slender. Anthers obtuse or obtusely apiculate. Ovary ovoid or depressed-globose, apex produced enclosing the style, stigmas 2-3 plumose. Grain ovoid, acuminate, beaked, pericarp crustaceous.—Species the following.

1. T. Griffithii, Munro in Trans. Linn. Soc. xxvi. (1868) 143, t. 3; stem-sheaths auricled, leaves 6-10 by \(\frac{3}{4}-\frac{1}{2}\) in oblong-lanceclate glaucous beneath, spikelets 2-3 in. linear puberulous, empty gls. 1 or 2 (the second sterile) narrowly ovate mucronate, fl. gls. 3-5 ovate acute mucronate 9-11-nerved, lodicules glabrous. Gamble Bamb Brit. Ind. 98, t. 86. Cephalostachyum Griffithii, Kurz For. Fl. Burma, in 566.

The Khasia Hills, Assam, Chittagong & Burma.

Stems 25-50 by ½-¼ in. diam., slender, arching, straggling or subscandent, branches whorled, internodes 18-26 in , walls thin. Stem-sheaths 6 by ½ in. or more, strigose with white hairs above; blude 3-4 in., dilated into large auricles fringed with long curved reflexed bristles, shaggy within; ligule short. Leares cuspidate, base rounded, petiole winkled, midrib with clusters of long hairs at the base, nerves 8-10 pairs with transverse pellucid glands; sheath keeled, auricles falcate and short ligule ciliate with deciduous hairs. Panicle leafy, branches often whip-like with few often pedicelled spikelets or avillary fascicles, rachis smooth striate; rachilla jointed between the gls. Palea longer than the fl. gl., keels fringed half way down, 4-nerved on each side. Lodicules ovate-lanceolate, glabrous, 7-9-nerved. Anthers yellow. Ovary stipitate, glabrous, style triquetrous. Grain obliquely ovoid, tapering at both ends, beaked, glossy.

2. **T. Wightii**, Beddome Fl. Sylvat. t. cccxxiii.; Forest. Man. p. ccxxxiii. (excl. Syn.) stem-sheaths papery hirsute top truncate not auricled, leaves 6-15 by 1-2 in. oblong-lanceolate, panicle with spiciform drooping branchlets, spikelets ½-1 in., empty gl. 1 ovate mucronate 5-7-nerved dorsally hirsute. fl gls. 1 or 2 mucronate nerved transversely, lodicules short ciliate. Gamble Bamb. Brit. Ind. 99, t. 87.

WESTERN GHATS, alt. 3-5000 ft., from N. Canara to Cape Comorin.

Stem 10-20 ft., by 1-1½ in., semi-scandent, branches pendulous, nodes narrowly ringed; internodes bright green, rough above, walls thin. Stem-sheaths 10-12 by 1-1½ in., hairs black-brown; blade subulate, 5-7 in., decurrent on the sheath; ligule  $\frac{1}{10}$  in. Leaves acuminate, tip scabrous twisted, whitish and sparsely hairy beneath, midrib broad yellowish, nerves 6-7 pair, tessellate by glands; sheath glabrous; ligule narrow Panicle large, spiciform branches biacteste, rachis smooth, slender. Rachilla of spikelets slender, flattened and concave below, thickened and ciliate above. Lodicules ovate, 3-5-nerved. Ovary stipitate, depressed-globose, smooth, style included in the long heak of the ovary. Grain stoutly stipitate, ovoid, beaked, glabrous.

3. T. attenuatum, Munro in Trans. Linn. Soc. xxvi. (1868) 143;

stem- and leaf-sheaths not auricled pale strigose, leaves 3-6 by  $\frac{1}{3}$ -1 in, panicle leafy, spikelets 1 in. clustered at the nodes of simple stiff terminal spikes, empty gl. 1 ovate mucronate 7-nerved ciliate, fl. gls. 2-3 longer 9-11-nerved and 1-2 terminal imperfect, lodicules lanceolate tip ciliate. Beddome Fl. Sylvat. Forest. Man. p. ccxxxiv.; Trim. Cat. Ceyl. Pl. 110; Gamble Bamb. Brit. Ind. 100, t. 88. Bambusa attenuata, Throates Enum. Pl. Zeyl. 375.

CEYLON; Central Province, alt. 4-6000 ft., Thwaites, &c.

Stems 12-25 ft. by ½-1 in. diam., tutted, tips filiform, wiry, nodes with many branches. Leaves smooth and pale beneath, tip subulate twisted scabrous, midrib faint, nerves 3-4 pairs, sheath sparingly strigose, margins ci iate, mouth truncate, fringed with deciduous bristles; ligule short. Panicle leafy, usually of short spikes clustered at the nodes, clusters bracteate composed of several barren spikelets and a few longer often curved feitile, rachis smooth swollen above. Lodicules 3-nerved. Filaments long, twisted. Ovary ovoid, acuminate, glabrous, style long, stigmas 3. Grain nairowed at both ends, beaked, glabrous.

4. **T. Dullooa**, Gamble Bamb. Brit Ind. 101, t. 89; stem-sheaths not auricled, leaves variable, spikelets ½-1 in. in a panicle of spiciform branches subtended by long truncate bracts softly pubescent, empty gls. 2 small truncate, fig. gls. ½ in. acuminate hairy 10-nerved, palea as long glabrous convolute not keeled, rachilla jointed produced into a long point.

BHOTAN, ASSAM, SILHET and the hills eastwd. to CHITTAGONG and UPPER BURMA.

Stems 20-30 ft. by 1-3 in. diam., tufted, sometimes scandent; nodes dark green, little prominent; internodes 16-40 in., dark green with a few whitish hairs; glossy, white beneath the nodes. Stem-sheaths variable, 4-12 in., strigose with white hairs, top concavely truncate loosely fringed with stiff bristles; blade 3-6 in., narrow, convolute, very hairy within, base rounded; ligule long, fimbriate. Leaves oblong-lanceolate, subciliately acuminate, tip twisted scabrid, base rounded, petiole \(\frac{1}{2} \dagger \text{in.}\), pubescent or glabrescent beneath, midrib pale, nerves 6-10 pairs, tessellate by pellucid dots; sheath striate, margins ciliate, mouth with stiff deciduous bristles, callus ciliate or glabrous; ligule long-fimbriate. Overy glabrous; style, long reldish.

5. T. Helferi, Gamble Bamb. Brit. Ind. 102, t. 90; stem-sheaths thick brittle top truncate with a narrow long-fringed band, leaves 6-18 by 1-3 in. oblong-lanceolate, paniele of long terminal whip-like densely hairy flexuous spikes bearing distant heads of few sterile spikelets which consist of 2-3 striate mucronate hairy empty gls Bambusa Helferi, Munro in Trans. Linn. Soc. xxvi. (1868) 114. Pseudostabyum Helferi, Kurz in Journ. As. Soc. Beng. xlii. (1872) ii. 253, For. Fl. Burm. ii. 568.

GARROW, KHASIA and JAINTEA HILLS, alt. 3500 ft., PEGU and MARTABAN.

Stems bushy or climbing, 20-40 ft. by 1-1½ in. diam. arching to the ground and rooting, young strigose with white hairs, nodes thickened whitish; internodes 20-50 in., young white-velvety, old with a white band, walls very thin. Stemsheaths 8-10 in., persistent, sparsely strigose with white bristles; blade lanceolate, glabrous or shortly hispid, decurrent on a fringed band on the top of the sheath; ligule narrow, fringed with stiff white hairs. Leaves very variable, unequal-sided, cuspidately acuminate, glabrous and glaucescent beneath, midrib stout, nerves 7-15 pairs, tessellate by pellucid glands; sheath glabrous, auricle long-fringed deciduous, callus smooth; ligule narrow, fringed with fragile hairs.—Very near T. Griffithia.

## 142. CEPHALOSTACHYUM, Munro.

Shrubby bamboos. Stems slender, straight. Stem-sheaths auricled. Leaves various, shortly petioled. Spikelets 2, in terminal globose heads, or

a panicle of bracteate heads, 1-fld, elongate, rachilla produced beyond the fl., empty gls 2-3, broad, chaffy, many-nerved, usually long-awned; flg. gls. more membranous, convolute, awns shorter; palea thin, many-nerved, keels 2 approximate Lodicules 3, 3-5-nerved. Stamens 6, free, anthers long. Ovary stipitate, ovoid, narrowed into a long thickened style, stigmas 2-3, plumose. Grain oblong, beaked, pericarp separable.—Species all Indian

\* Spikelets in a solitary head

1 **C. capitatum,** Munro in Trans. Linn. Soc xxvi. (1868) 139; leaves 4-8 by 1-2 in ovate-lanceolate base unequally rounded, head  $1-1\frac{1}{2}$  in diam., bracts broad long-awned glabrous, spikelets  $\frac{1}{2}-\frac{2}{3}$  in. terminating short spikes, palea obtusely mucronate tip entire, anthers obtuse Gamble Bamb. Brit. Ind 104, t. 91. Bambusa capitata, Wall. Cat. n. 8913

SIKKIM and BHOTAN HIMALAYA, alt. 2-8000 ft., KHASIA, JAINTEA, and NAGA HILLS.

Stems 12-30 ft. by 1-1½ in., semi-scandent; nodes not prominent, internodes often 3 ft. or more, walls thin. Stem-sheaths of young stems papery, 6-12 by 2-3 in., strigose with pale brown hairs, month triangular, of the longer upper truncate, of the shorter lower retuse; blade long, hairy within, base rounded, decurrent into rounded sometimes fringed auricles; ligule nariow. Leaves pale green, whitish beneath, glabrous on both surfaces, midrib prominent, nerves 4-10 pairs, pellucid dots oblique; sheaths smooth, shining, auricle short with curved cilia. Empty gls. softly hairy below; lower 1-3 fig. gls. sterile; palea hairy between the keels, rachilla produced. Lodicules ovate-lanceolute, 3-5-nerved, shortly ciliate. Anthers long, tips emarginate. Ovary ovoid, style often twisted, stigmas 2 hairy. Grain depressed-ovoid, beaked, shining, pericarp crustaceous.

Var. dccompositum, Gamble l. c. 105; spikelets in spicate almost paniculate

clusters, many fertile.-Sikkim and Khasia Hills.

2. **C. pallidum,** Munro in Trans Linn. Soc xxvi. (1868) 139; leaves 1-5 by  $\frac{1}{2}$ -1 in. base unequally rounded, heads about 1 in., bracts broad rounded, spikelets  $\frac{2}{3}$ - $\frac{5}{4}$  in., palea 2-fid, anthers long-apiculate. Kurz For Fl Burma, in. 563, Gamble Bamb Brit. Ind 105, t. 92. Bambusa andropogonifolia, Griffith Itin. Notes, 124, No 417

KHASIA, MISHMI, PATROY and MUNNIPORE HILLS, ascending to 5000 ft.,

Graffith, &c.

Shrubby or subarboreous, branches whorled Leaves pale green, tip capillary, glabrons or puberulous beneath, not tessellate, mndrib pale, nerves 4-6 pairs; sheath striate, margins ciliate, auricle rounded with a few deciduous cilia; ligule long. Head in the axil of a leaf, of many-long-awned empty gls. or sterile fi gls. or with a few exserted fertile spikelets, all bracteate at the base, empty gls. concave, awned, many-nerved; fig gls. similar, awn shorter than the gl; palea many-nerved, tip and base harry, rachilla shortly produced. Lodicules pubescent and ciliate. Ovary ovoid-lanceolate, style long conical, stigmas 2 harry. Grain globosely ovoid, top conical and beaked, wrinkled.

3. **C. latifolium,** Munro in Trans. Linn. Soc. xxvi. (1868) 140; stem sheaths linear, oblong top narrow, leaves 10-16 by 1-4 in. ovate or ovatelanceolate base unequal cuneate or rounded, sheaths not fringed, heads  $1\frac{1}{2}-2$  in. diam. of clustered sterile and 1-fld., fertile spikelets  $\frac{1}{2}-1$  in. long with broad awned biacteoles, tip of palea entire, anthers obtusely mucronate. Gamble Banb. Brit. Ind. 106, t. 93.

BHOTAN and MUNNIPORE HILLS, alt. 5-7000 ft., Griffith, &c.

Shrubby semi-scandent. Stems thin, rough, dark green, whitish below the nodes which are conspicuously ringed. Stem-sheaths 6-9 by 2-3 in , papery, sides

parallel, top concave with sub-acute triangular glabrous auricles; blade 4-5 by  $\frac{1}{8}-\frac{1}{2}$  in., subulate; ligule broad. Leaves glabrous, base cureate or rounded, petiole wrinkled, midrib pale prominent, nerves 8-18 pairs, pellucid dots distant; sheath striate, margins ciliate produced up to the broad ligule; callus broad, thick, emarginate. Spilelets glabrous, empty gls. ovate-lanceolate, glabrous, long-awned; flg. gls. acuminate, awn shorter; palea obtuse, tip hairy, nerves reticulate; rachilla shortly produced. Lodicules 3-nerved. Ovary ovoid, style long flattened, stigmas 2 short plumose. Grain broadly ovoid, stipitate, curved above, beaked, pericarp crustaceous.

4. **C. Fuchsianum**, Gamble Bamb. Brit. Ind. 107, t. 94; stemsheaths thin top deeply concave with a bristly tringe in the sinus, leaves 8-14 by 2-4 in., ovate-lanceolate, head  $2\frac{1}{2}$  in. diam., simple globose or compound elongate and lobed, spikelets  $\frac{3}{4}$ -1 in. glabrous sterile and fertile mixed with awned bracts, palea 2-fid anther tip apiculate or forked.

Bhotan and the Duphla Hills, alt. 6-8000 ft., Fuchs, Lister, Gammie, &c. Arborescent, semi-scandent; stems small, soft, thin-walled, pale, branches whorled Stem-sheaths 12 by 4 in, strigose with light brown hairs, sides nearly pirallel, margins reticulately nerved, young cylindric, blade in the base of the sinus, 6-8 in., subulate, pubescent below; lighle small. Leaves cuspidately acuminate, base angled or rounded, undrib shining, nerves 7-10 pairs, tessellate by pellucid dots; sheath soft, margins thickly long-ciliate, anricle elongate thickly clothed with white bistles ½-¾ in. long; lighle moderate, ciliate. Empty gls ovate, long-awned, glabrous, 17-19-nerved; flg gl. longer, awn shorter, 21-23-nerved and cross-nervuled; palea pubescent, 2-keeled and 5-6 nerved on each side; rachilla shortly produced. Lodicules 3-5-nerved, ciliate Ovary narrowly ellipsoid, style thick, stigmas 2 short. Grain as in C. latifolium, but tip more rounded, pencarp crustaceous.

- \*\* Spikelets in panicled or spicate heads or fascicles.
- 5. **C.** pergracile, Munro in Trans. Linn. Soc. xxvi. (1863) 141; stem-sheaths very short 2-auricled strigose with black deciduous hairs afterwards polished, leaves 6-14 by  $1-2\frac{1}{2}$  in. linear-lanceolate rough on both surfaces, spikelets  $\frac{1}{2}-\frac{2}{3}$  in. dam. bracteate clusters forming fillform drooping spikes, gls 3-4, empty gls. 0, lower 1-2 sterile, fertile solitary densely hairy with a terminal sterile, palea long 2-fid, anthers obtuse purple. Kurz For. Fl. ii. 564; Gamble Bamb. Brit. Ind 108, t 95.

Arborrous, deciduous. Stems 30-40 ft. by 2-3 in. diam., tutted, erect, glaucous, whitish below the scarcely thickened nodes; internodes 12-18 in., walls very thin. Stem-sheaths 4-6 by 6-8 in.; blade 2 in., densely hairy within, decurrent in a waved tringe bordering the top of the sheath and fringed auricles; ligule very narrow. Leaves thin, base rounded or cuneate, subglaucous beneath, midrib conspicuous, nerves 7-13 pairs, sparingly tessellate; sheath glabrous, mouth auricled, callus small ciliate; ligule very narrow. Panicle large; heads 1½-2 in apart, bracts small

Throughout Burma, Assam, The Naga Hills and Chota Nagpore.

nerves 7-15 pairs, sparingly tessenate; steath glavous, mouth attricet, cartas small cliafte; ligule very narrow. Panicle large; heads 1½-2 in apart, bracts small chaffy, rachis wrry Lodicules narrow, tip ciliate. Otary smooth, base subglobose, narrowed into a trigonous style, stigmas 2-3 stout. Grain ½ in., obovate-oblong, grooved on one side, beak as long as itself.

6. **C. flavescens**, Kurz in Journ. As. Soc. Beng. xlii. (1873) ii. 252, For. Fl. Burm. ii. 564; stem-sheaths short, top triangular truncate smooth or strigose with white or pale brown hairs, leaves 3-6 by  $\frac{1}{2}$ - $\frac{3}{4}$  in. linear, sheath with narrow auricles, spikelets  $\frac{1}{2}$  in. long linear acuminate hairy, empty gls. 1-2 ovate-lanceolate mucronate hairy 7-9-nerved, fl. gl. solitary similar, palea 2-mucronate, anthers obtuse or acute yellow.

Gamble Bamb. Brit. Ind. 109, t. 96. Melocanna lutescens, Kurz in Herb. Calcutt.

BURMA; Pegu? (cult. in Calcutta and Madras gardens).

Evergreen, subarborescent. Stems 10-20 ft. by 1-1; in. diam., smooth, dull green, at length yellow, nodes not prominent; internodes rather long. Stem-sheaths 4-5 by about 5 in., smooth or strigose with pale or brown hairs; blade 1-1; in., erect, base cordate decurrent as a waved fringe with pointed long auricles edged with stiff curved bristles; ligule narrow. Leaves acuminate, glabrous or sparsely hairy beneath, base contracted, midrib narrow, nerves 4-6 pairs; sheath smooth, glabrous, callus very narrow, auricles long narrow, ligule narrow. Panicle of few whorled slender branches with clusters of spikelets 2-2; in. apart; palea with hairy margius. Lodacules oblong, tip ciliate, 3-5-nerved. Ovary ovoid, acuminate, smooth; style trigonous, stigmas white-hairy.

7. **C.** virgatum, Kurz For. Fl. Burma, ii. 565; panicle leafless drooping, branchlets fascicled bearing lax distant heads of few nearly glabrous fertile and sterile spikelets, rachis smooth flattened on one side, spikelets \( \frac{1}{2} \) in. nearly glabrous narrow acute with 2 small sterile fls. at the base, empty gl. short ovate mucronate, flg. gl. convolute coriaceous mucronate, palea 2-mucronate, anthers obtuse. Gamble Bamb. Brit. Ind. 110, 132, t 97. Melocanna virgata, Munro in Trans. Linn. Soc. xxvi. (1868) 133.

UPPER BURMA; on the Mogaung river, Griffith; Bhamo district, Oliver.

A medium-sized, slender, tufted Bamboo. Stems erect, dark green, young white scurfy, nodes not thickened; internodes 18-24 by 4 in. diam., regular, walls thin. Stem-sheaths 6-8 by 7-10 in. broad at the base, pale, narrowed to a nearly straight top 5-6 in. broad, strigose with golden hairs; blade 4-5 in., usually recurved, decurrent along the top of the sheath in a narrow straight band bordered with stiff recurved bistles, glabrous above, strigose beneath; base 1-1½ in. broad cordate, tip cuspidate, margins incurved; ligule narrowed, fimbriate. Leaves rather variable, thin, 6-12 by 1½-2¾ in., oblong- to linear-lanceolate, cuspidately acuminate, rough on both surfaces, tip and margins scabious, pale beneath and slightly hairy, mid-rib pale broad, nerves 10 pairs with 5-7 intermediate, cross-nervules few; sheath smooth, striate, keeled, ending in a narrow ciliate callus, and bearing short bristly nuricles; ligule very short, fimbriate. Panicles large, heads bracteate; bracts narrow chaffy. Ludicules lanceolate, acuminate, shortly ciliate, faintly 3-nerved. Orary ovoid, glabrous, style thickened; stigmas 2-3, purple, plumose.

## 143. DINOCHLOA, Buse.

Lofty evergreen scandent Bamboos. Stems zigzag, usually covered with persistent sheaths; nodes with a broad leathery ring left by the sheath. Stem-sheaths thick, loosely clasping, base wrinkled. Leaves large, rather soft, transverse nervules of pellucid glands. Panicle large, compound, of slender spicate clusters of spikelets. Spikelets very many, minute, in subglobose sessile heads on short branchlets, 1-fld.; rachilla marticulate, not produced; empty gls. I-4 broad, very obtuse, upper gradually larger; fl. gl. similar; palea convolute, not keeled, as long or longer than the gl. Lodicules 0. Stamens 6, free short. Ovary ovoid, glabrous, style short. Grain ovoid, acuminate.—Species, the following.

1. **D. Tjankorreh**, Büse in Miq. Pl. Jungh. 388; stem-sheaths narrowed to the mouth, leaves 6-10 by  $1-1\frac{1}{2}$  in. Miq. Fl. Ind. Bat. iii. 415; Munro in Trans. Linn. Soc. xxvi. 153, t. 5; Kurz Ind. Forester, 352; Gamble Bamb. Brit. Ind. 112. Bambusa scandens, Blume ex. Nees in

Flora, vii. (1824) 291. Nastus Tjangkorreh, Schultes Syst. Veg. vii. 1358; Kunth Enum. Pl. i. 430; Steud Syn. Gram. 333. Chusquea amplopaniculata, Steud. l.c. 337; Miq. l.c. 415.

MALAY PENINSULA; Perak, Ridley .- DISTRIB Malay and Molucca Islds.

Stems 100 ft. by 1 in. diam. or more, green, glossy, nodes swollen. of the branches often thorny; internodes 9-18 in., hairy above, walls thin. Stem-sheaths loose, leathery, cylindric, narrowed to the non-auricled mouth, sparsely bristly; blade ovate-lanceolate, minutely hispid above; ligule rather broad. Leaves lanceolate, rather soft, base narrowed, petiole very hairy, smooth on both surfaces, mid-rib conspicuous, nerves 7-9 pairs; sheaths strigose at length glabrous, mouth rounded with long white bristles; ligule rather broad, long-ciliate. Panacle compound, branches thin, wiry; rachis curved, striate, flattened on one side; nodes with a ring formed by the base of the fallen bracts; clusters with few fertile and many empty gls. Spikelets \(\frac{1}{10}\) in. or less, ovoid, glossy, brown, glabrous; empty gls. with 1-2 smaller at the base, convolute, 5-7-nerved; flg. gl. similar. Stamens included, anthers acute. Stigma 2-fid, not plumose. Grain \(\frac{1}{10}\)-\frac{1}{5}\) in., fleshy.

Var. andamanaca, Gamble l. c. t 98; spikelets straw-colrd., leaves up to 12 by

Var. andamanıca, Gamble l. c. t 98; spikelets straw-colrd., leaves up to 12 by 2 in. softly ovate-lanceolate, mouth of sheaths more ciliate, ligule more fimbriate. D. andamanica Kurz in Journ. As. Soc. Beng. xlii. (1873) ii. 253, For. Fl. Burm.

ii. 570 .- Andaman and Nicobar Islds., Steber, Kuiz, &c.

2. **D. M'Glellandi,** Kurz in Journ. As. Soc. Beng. xlii. (1873) ii. 253, For. Flor. Burn. ii. 371 (Maclellandi); stem-sheaths truncate at the mouth, leaves 6-18 by 1-4 in. Gamble Bamb. Brit. Ind. 113, t. 99. Bambusa M'Clellandi, Munro in Trans. Linn. Soc. (1868) 114.

CHITTAGONG, PEGU and MARTABAN, Kurz, &c.

Stem clumbing, 100 ft., or short and straggling, 1-2 in. diam., grey green, nodes swollen; internodes 6-8 in., young often angled, strigose with brown pungent hais. Stem-sheaths 6-9 in. by 7-9 in. at the base and 2-3 at the top, cylindric, leathery, strigose with golden-brown hairs ending in a narrow dark glabrous margin and top; blade lanceolate, glabrous without, densely hairy within, base rounded decurrent on the sheath; ligale entire or subserrate. Leaves broadly oblong-lanceolate, base unequally rounded, narrowed into a broad thick petiole \(\frac{1}{2}\) in. long or less, glabrous on both surfaces, one or both margins retrorsely scabrid, mid-rib prominent, nerves 10-18 pairs; sheath transversely nerved, keeled, at first strigose, mouth produced into a rounded naked auricle; ligule entire or serrate.

#### 144. SCHIZOSTACHYUM, Nees.

Erect or climbing, arborescent or shrubby Bamboos; stems usually slender, smooth, walls thin. Stem-sheaths short, cylindric, auricles small. Leaves broad, petioled. Panicle terminal, of spicate branches bearing heads of spikelets, often reduced to a spike of heads, rachis slender. Spikelets slender, fascicled, peduncled or 2-3-nate; empty gls. 1-3, narrow, usually mucronate, rachilla elongate between them and much beyond with a rudimentary gl.; fl. gls. 1-2, articulate below, convolute; palea like its gl., convolute, not keeled. Lodicules 0-4, narrow. Stamens 6, exserted, anthers narrow, filaments free. Ovary narrow, pericarp produced as a tubular beak enclosing the style, stigmas 3 short plumose. Grain ovoid, beaked, beak inclined, pericarp crustaceous; seed rounded.—Species 16, trop. Asia and Pacific.

- \* Heads of spikelets in terminal simple spikes.
- 1. S. tenue, Gamble Bamb. Brit. Ind. 114, t. 100; leaves 4-6 by

1-1 in linear-lanceolate, heads 1-3 in a spike bracteate, spikelets few about 1 in long, empty gls. 1-2 ovate acute 5-7-nerved, fig. gl., longer. S. elegantissimum, Kurz Ind. Forester, i. 348. (Bambusa elegantissima, Hassk Pl. Juv Rar. 42. Beesha elegantissima, Kurz ev Munro in Trans. Linn. Soc. xxvi. (1808) 146).

MALAY PENINSULA; Pahang, Malacca and Johore, Ridley.

Stems graceful, slender, scandent. Leaves narrowed into a rather long petiole, smooth and glabrous on both surfaces, midrib shining, nerves 3-5 pairs, distantly tessellate by glands, sheaths smooth truncate, callus broad; ligule very narrow. Rachis of spikes slender, curved; bracts chaffy, mucronate, yellowish. Spikelets narrow, acuminate; palea longer than its gl., 2-keeled, glabrous, 2-mucronate. Lodicules oyate, acute, 3-5-nerved. Stumens exserted, anthers linear tips rounded.

2. S. chilianthum, Kurz in Journ. As. Soc Beng. xxxix. (1870) II. 88, Ind Forester, i. 348; leaves 6-10 by \( \frac{2}{4} - 1 \) in linear-lanceolate, heads 3-6 in a spike, spikelets about \( \frac{1}{2} \) in. long, empty gls. ovate mucronate striate glabrous, fig. gl. longer. Gamble Bamb Brit Ind. 115, t. 101. Chloothamnus chilianthus, Buese in Pl. Jungh. 387; Miq. Fl. Ind Bat. iii. 415. Melocanna gracilis, Kurz ex Munro in Trans. Linn. Soc. xxvi. (1808) 133.—Bambusa, Wall. Cat. n. 5032.

Stem 6-8 ft. by \(\frac{1}{2}\)-\(\frac{3}{4}\) in. diam., smooth, glos-y, nodes not prominent; internodes fistular, glabious; flowering and leafing branches together half-whorled at the nodes with many bract-like sheaths; branchlets slender, curved, smooth. Stem-sheaths glabrous, smooth, truncate, margins ciliate; blade narrowly lanceolate, base rounded, harry, decurrent in a long fringed band, auricles nirrow long-fringed; ligule narrow long-fringed. Leaves long acuminate, setaceous point sometimes \(\frac{1}{4}\) in., midrib not prominent, nerves \(\frac{4}{6}\) pairs, tessellate by pellucid glands, sheath glabrous, mouth truncate bearing about \(\frac{1}{4}\) ostiff white deciduous bristles, auricles short, callus narrow. Heads about \(\frac{1}{4}\) in. bload, rachis slender, grooved, glabrous. Spikelets acuminate. Palexe \(\frac{2}{4}\), micronate, keeled above only. Lodscules \(\frac{3}{4}\), \(\frac{5}{4}\)-finerved, ciliate. Ovary oblong, stigmas \(\frac{3}{4}\) plumose purple. Grain nearly \(\frac{1}{4}\) in, beak inclined.

\*\* Heads of spikelets in panicled spikes.

3. **S. Blumei**, Nees Agrost. Bras. 535; leaves 9-10 by  $1\frac{1}{4}$ - $1\frac{\pi}{4}$  in. on sterile branches up to 16 in. oblong-lanceolate, spikelets under  $\frac{2}{3}$  in. cylindric, rachilla ciliate, empty gls 2 oblong long-mucronate glabrous, flg. gl. longer, paleæ 1 or 2 inner convolute, lodicules 0, antheis obtuse. Kunth Enum. Pl. 1 435; Rupr. Bamb. 43, t. 16, 17, f. 4; Steud. Syn. Gram. 332; Miq. Fl. Ind Bat. iii. 424, Murro in Trans. Linn. Soc. xxvi. (1868) 136; Kurz Ind. Forester, i. 350, Gamble Bamb. Brit. Ind. 116, t. 102. Melocanna tenuispiculata, Kurz in Hort. Buttenz. and Calc.

SINGAPORE, Ridley.—DISTRIB. Java.

Stems 30 tt., hollow, fragile, glabrous Stem-sheaths cylindric, slightly narrowed to the ciliate truncate mouth, strigose with white bristles; blade leafy, erect; ligule narrow. Leaves acuminate, base rounded or narrowed, rough on both surfaces, pubescent beneath, midrib narrow, nerves 5-6; sheath smooth, keeled, mouth truncate and margins ciliate with white bristles; ligule short fimbriate. Spikes of panicle with long spreading erect or deflexed spikelets \( \frac{1}{2} - \frac{3}{2} \) in. long and chaffy bracts, rachis very slender; empty gls. 2, striate. Anthers green, obtuse. Ovary narrowly ellipsoid

4. S. latifolium, Gamble Bamb. Brit. Ind. 117, t. 103; leaves 9-12 by  $1\frac{1}{2}-2\frac{1}{2}$  in. oblong acuminate, spikelets  $1-1\frac{1}{3}$  in. long acuminate, empty

gls. 2 oblong long-mucronate, fig. gls. 1 much larger ovate-lanceolate long mucronate convolute, lodicules 3-4, anthers obtuse tip penicillate.

MALAY PENINSULA; Pahang, Ridley.

Leaves smooth on both surfaces, base rounded, petiole  $\frac{1}{3}$  in. wrinkled, midrib prominent beneath, nerves 10-12 pairs; sheath keeled, smooth, callus broad, auricle large falcate bearing long bristles; ligule short, long-ciliate. Panicle 6-12 in. Spikelets mixed with ovate-lanceolate glabrous bracts, shortly pedicelled; empty gls. distant at the base; margins of fig gl. often ciliate; palea lanceolate, 2-micronate, dorsally keeled or channelled. Lodicules 3-4,  $\frac{1}{10}$ ,  $\frac{1}{3}$  in., 4th longer (a modified stamen?). Anthers long, narrow. Ovary narrowly lanceolate.—Near S. longispiculatium, Kurz Ind. Forester, i. 351, but differs in the presence of lodicules and in the penicillate anther-tips.

5. **S. aciculare**, Gamble Bamb. Brit. Ind. 117, t. 104; leaves 6-9 by  $1\frac{1}{2}-2$  in. ovate-oblong cuspidate, petiole pubescent, spikelets  $1\frac{1}{4}-1\frac{1}{2}$  in. needle-like, empty gls. 2 oblong mucronate pubescent, fig. gl. linear convolute appressedly hairy long-mucronate, lodicule 1, anthers obtuse tip penicillate.

MALACCA; at Rupayoong, Alwis.

A small bamboo. Leaves almost elliptic, base rounded or narrowed, tip an obtuse scabrous hairy point, pale and smooth beneath, midrib hardly prominent, nerves 10 pairs; sheath smooth, mouth with a few long bristles, callus rounded. Spikes slender, rachis flattened on one side; bracts few, short. Spikelets very long, narrow, on short bracteate peduncles; empty gls. 2, pubescent, oblong, mucronate; palea as long as the fig. gl., inucronate, glabrous; rachilla short, grooved, glabrous. Lodicule 1, narrowly lanceolate, glabrous. Anthers very long, narrow. Ovary narrowly ovoid, glabrous.

#### 145. MELOCANNA, Trin.

Arborescent unarmed Bamboos. Stems solitary on the branches of a rhizome, distant. Stem-sheaths short, brittle, shortly auricled, blade very long. Leaves broad, petioled, smooth. Panicle large, compound, of spicate one-sided spikelets. Spikelets 2-3, fascicled in bracts in the axils of the spikes, acuminate with 1 fertile and 1 or more sterile fls.; empty gls. indefinite, acuminate, mucronate, striate; fl. gl. similar; palea like its gl. convolute not keeled. Lodicules 2, narrow. Stamens 5-7, free or irregularly connate. Ovary glabrous, style elongate, stigmas 2-4 shortly harry. Fruit very large, pyriform, long-beaked, pericarp very thick.—Species 1 or 2.

1. M. bambusoldes, Trin. in Spreng. New Enterdeck. ii. 43, Syst. ii. 113 (excl. Syn. Lour.); stem-sheaths 5-6 in. strigose with whitish hairs abruptly truncate with rounded auricles, leaves 6-14 by 1-3 in. lanceolate or oblong-lanceolate, spikelets about ½ in. spinous glabrous, empty gls. 2-4 lanceolate, fig. gl similar but thinner. Rupr. Bamb. 65; Steud. Syn. Gram 331; Miq. Fl. Ind. Bat. iii. 423; Munro in Trans. Linn. Soc. xxvi. (1868) 132; Kurz For. Fl. Burm. ii. 569; Gamble Bamb. Brit. Ind. 119, t. 105. Bambusa baccifera, Rowb. Corom. Pl. iii. 38, t. 243, Fl. Ind. ii. 197. Beesha Rheedii, Kunth in Journ. de Phys. xlv. (1822) 4; Revis. Gram i. 141; Enum. Pl. i. 434 (excl. Syn.). B. baccifera, Schult. Syst. vii. II. 1336. Nastus baccifera, Roxb. ex Rasp. in Ann. Sc. Nat. Ser. I. v. (1825) 442.

ASSAM, the KHASIA and GARROW HILLS, CHITTAGONG, ARRACAN, and TENASSERIM.

Evergreen. Stems solitary on branches of the rhizome, 50-70 ft. by  $1\frac{1}{2}$ -3 in. diam., green, straight, unbranched till near the top, nodes a thin ring; internodes VOL. VII.

12-20 in., walls thin. Stem-sheaths 5-6 in. by 6-12 at the base, yellow, margins straight for \(\frac{2}{3}\) up, then waved, auricles often long-fringed; blade up to 1 ft., base 1 in. broad, decurrent in a narrow strip along the top of the sheath; ligule very narrow, serrate. Leaves from fascicled branches, tip long twisted scabrous, glaucescent beneath, young hairy, margins ciliate, inner and 2-3 adjoining nerves scabrous, midrib prominent, nerves 8-12 pairs, tessellate by pellucid glands; sheath glabrous, auricles pointed, ciliate and bearing 10-12 large whitish bristles; ligule very short. Panicle with drooping branches. Spikelets about \(\frac{1}{2}\) in., glabrous; empty gls. with sometimes abortive buds. Lodicules erose, 3-5-nerved. Fruit up to 3-6 by 2-3 in.

2. M. humilis, Kurz For. Fl. Burm. ii. 569; stem-sheaths very short glabrous? mouth much produced rounded inflated and sinuate, leaves 4-6 by  $\frac{2}{3}$ -1 in. lanceolate to linear-lanceolate roughish puberulous beneath, base obtuse, petiole about  $\frac{1}{3}$  in., sheath glabrous mouth minutely auricled deciduously long-fringed. Gamble Bamb. Brit. Ind. 120, t. 106.

ARRACAN and PEGU, Kurz.

Known chiefly from the leaves and sheath. Stems 8-15 by 1 in. diam.; nodes hardly thickened, internodes about 1 ft. Blade of stem-sheath linear, erect, decurrent in a narrow nude green strip bordering the sinuses; ligule very narrow, entire.

#### 146. OCHLANDRA, Thwaites.

Shrubby, gregarious, reed-like Bamboos. Stems erect, internodes rather long, thin-walled. Stem-sheaths thin, persistent, auricles small. Leaves as in Bambusa, margins cartilaginous, nerves many; sheath striate, fringed; ligule (except in one sp.) short. Spikelets fertile and sterile mixed, or whorled on terminal spikes or spicate panicles from a leafy branchlet, often very large, 1-fid.; empty gls. 2-5, usually mucronate; fig. gl. like the uppermost empty, mucronate; palea membranous, not or faintly 2-keeled. Lodicules 1 or more, usually appressed to the filaments. Stamens 6-120, filaments free or monadelphous, exserted; anthers long, narrow. Ovary narrow, style elongated, stigmas 3-6. Fruit large, ovoid, long-beaked, pericarp fleshy.—Species the following.

- \* Stamens many, ligules short, filaments free.
- 1. **C. Rheedii,** Benth. ex Gamble Bamb. Brit. Ind. 121, t. 107; leaves 4-10 by  $\frac{1}{2}-l\frac{1}{4}$  in. linear-lanceolate, sheath smooth, auricles falcate fringed with bristles, spikelets cylindric acute glabrous, sterile  $\frac{1}{2}-\frac{2}{3}$  in., fertile  $l-l\frac{1}{4}$  in., empty gls. 2-3 broadly ovate mucronate many-nerved, fig. gl. larger subacute, anthers mucronate. Beesha Rheedii, Kunth Enum. Pl. i. 434 (excl. all cit. but Rheede); Rupr. Bamb. 65, Munro in Trans. Linn. Soc. xxvi. (1868) 144; Beddome Fl. Sylvat. Forest. Man p. ccxxxiv. Melocanna Rheedii, Steud. Syn. Gram. 332. Bambusa scriptoria, Dennst. Schluess. Hort. Malab. 31.—Rheede Hort. Mal. v. t. 60.

COCHIN and TRAVANCORE, White, Johnstone, &c.

Stems erect, up to 16 ft. by 1 in. diam.; nodes somewhat raised; internodes about 17 in., walls \( \frac{1}{2} \) in. thick. Stem-sheaths 4-6 in., purplish-green, young hairy, margins ciliate, top rounded-truncate, auricles falcate long-ciliate; blade subulate, base hairy within; ligule short, ciliate. Leaves usually small, base rounded, smooth on both surfaces, midrib narrow, nerves 5-10 pairs. Spikes or spicate panicles terminal or axillary on leafy branchlets. Palea convolute, long-mucronate, base membranous. Lodicules many, \( \frac{1}{2} \) in., acute, glabrous, 1-7-nerved. Stamens 15-18. Ovary oblong, style embraced by the enlarged perigynium, stigmas 3, plumose. Fruit oblong, long-beaked.

Var. sivagiriana, Gamble l. c. 122, t. 108; spikelets rather larger, stamens up to 60, leaves generally larger.—Pulney and Sivagiri Hills, Beddome.

2. **C.** stridula, Thw. Enum. Pl. Zeyl. 376; leaves 8-12 by  $1\frac{1}{3}-2\frac{1}{2}$  in oblong-lanceolate, young sheath hirsute, auricles falcate fringed with bristles, spikelets 1 in. cylindro-conical sparsely hairy, empty gls. 2-3 convolute mucronate ciliate, fig. gl. larger, anther tips 2-fid and mucronate. Trimen Cat. Ceyl. Pl. 110; Gamble Bamb. Brit. Ind. 123, t. 109. Beesha stridula, Munro in Trans. Linn. Soc. xxvi. (1868) 145; Beddome Fl. Sylvat. Forest. Man. p. cexxxiv. Bambusa stridula. Moon Cat. Ceyl. Pl. 26.

CEYLON; in the southern parts of the Island, Thwartes.

Stems 6-18 ft. by \(\frac{1}{2}\)-\(\frac{2}{3}\) in. diam., tufted, light green, geniculate, nodes ringed; internodes 12-14 in., scabrous. Stem-sheaths persistent, cylindric, glabrous, young purple, tip rounded with falcate small fringed auricles; blade subulate. Leaves broad, somewhat rough beneath, base rounded, petiole broad, midrib slender, nerves 10-12 pairs, tessellate by pellucid glands. Spikelets in a terminal panicle, whorled, few fertile, rachis of spike long, rough, glaucous. Lodicules 6-12 or more, lanceolate, 1- many-nerved, convolute. Stamens up to 30, filaments free, flat. Ovary narrow, beak trigonous; stigmas 4-5, plumose, at first twisted Fruit 1 in., ovoid, beak 1 in.

Var. maculata, Gamble I. c. 124; stem greyish-green mottled with dark purplish blotches. Teinostachyum? maculatum, Trim. in Journ. Bot. xxiii. (1885) 273.

Cat. Ceyl. Pl. 110.—Ceylon, Ferguson.

3. **O. Beddomei**, Gamble Bamb. Brit. Ind. 124, t. 110; leaves 6-8 by  $1-l\frac{1}{2}$  in. oblong-lanceolate margins revolute, auricles decurrent fringed with bristles, spikelets  $1-l\frac{1}{2}$  in. hirsute, empty gls. 2 ovate long-nucronate many-nerved, fig. gl.  $l\frac{1}{3}$  in. ovate-lanceolate mucronate many-nerved glabrous, anther tips 2-fid and mucronate.

NIIGHIRI HILLS; in the Wynaad district, Beddome.

Leaves long-acaminate, base unequally rounded, subglaucous beneath, midrib slender, nerves about 8 pairs; sheaths puberulous, margins ciliate, callus narrow. Panicle short, spicate, terminating a leafy branchlet; rachis stiff, puberulous. Spikelets few together, cylindric-conical, 2-3-bracteate, hairs tuberous-based, brown, spreading; palea 1 in., membranous, acute or obtuse. Lodicules 5, all different, 3-7-nerved, entire or 2-fid. Stamens about 32. Ovary subglobose, beak embracing the style, stigmas 5-6 plumose.

- \*\* Stamens many, liqule short, filaments coherent.
- 4. O. travancorica, Benth. ex Gamble Bamb. Brit. Ind. 125, t. 111; leaves 6-18 by 2-4½ in. broadly oblong-lanceolate, auricles short falcate spikelets 2-2½ in. ovoid or ovoid-oblong, glabrous, empty gls. usually 3, lowest truncate tip subulate upper 2 in. long-acuminate, fig. gl. like the upper empty, anther-tips penicillate. Gamble Bamb. Brit. Ind. 125, t. 111. Beesha travancorica, Beddome Fl. Sylvat. t. cccxxiv. Forest. Man. p. ccxxxiv.

TRAVANCORE and TINNEVELLY, alt. 2-5000 ft., Beddome, &c. (monopolizing

miles of country).

An erect gregarious reed-like bamboo. Stems 6-20 ft. by 1-2 in. diam., nodes swollen and scarred; internodes 1\frac{1}{2}-5 ft., rough; walls very thin. Stem-sheaths 6-8 in., thin, vertically wrinkled, young strigose with tuberous-based hairs, tip truncately rounded, fringed with bristles; blade subulate. Leaves glabrous or scaberulous, base rounded, petiole broad, midrib thick below, nerves 12-17 pairs, tessellate by pellucid glands; sheath glabrous, keeled, margins ciliate, callus shining; ligule short, truncate. Spikelets a few fertile and a few much smaller sterile together in the axils of ovate-lanceolate smooth bracts with subulate deciduous tips; single

spikelets with 2-4 small sheathing bracts; gls. all many-nerved; palea acute, faintly 2-keeled. Lodicules 3, 1 in., membranous, 3-7-nerved. Stamens up to 120, filaments coherent. Ovary narrow, tip 4-angled, stigmas 5-6 plumose spirally twisted together. Fruit 2 in. by \( \frac{1}{2} \) in. diam., ovoid-oblong, beak 2 in., pericarp flesby.

Var. hirsuta, Gamble 1. c. 126, t. 112; spikelets densely brown velvety, leaves thicker, margins more cartilaginous, leaf-sheaths with appressed tuberous-based hairs.

-Travancore Hills, Beddome.

- \*\*\* Stamens many, liqule 1 in. or more, filaments free.
- 5. O. Brandisii, Gamble Bamb. Brit. Ind. 126, t. 113; leaves 10-20 by 13-3 in. oblong-lanceolate acuminate, auricles short fringed, spikelets 1-11 in. conical glabrous bracteolate with chaffy scales, gls all manynerved, 3-4 lower empty thick ovate truncate tip subulate, upper thinner, fig. gl. membranous, anthers long-apiculate Bambusa Wightii, Munro in Trans. Linn Soc. xxvi. (1868) 111. - Wight Cat n. 1009.

TINNEVELLY GHATS; at Courtallam, Wight, Brandis.

Leaves thick, base narrowed, glabrous on both surfaces, whitish beneath, petiole short broad wrinkled beneath, midrib stout, nerves 10-13 pairs strong, tessellate by pellucid glands; sheath structe, callus smooth rounded. Spike terminal, rachis thick, whorls of spikelets several in the axils of ovate glabrous bracts; palea like the fig. gl. but smaller. Lodicule solitary, 1 0 in ; many-nerved, truncate and retuse. Stamens up to 60. Ovary glabrous, stigmas 5, plumose.

- \*\*\*\* Stamens 6 or fewer, unequal, filaments free or coherent, ligule short.
- 6. O. Ridleyi, Gamble Bamb. Brit. Ind. 127, t. 114; leaves 9-10 by 1-11 in. oblong-lanceolate cuspidately acuminate, auricles rounded or falcate long-ciliate, spikelets about 1 in. appressedly harry, empty gls. 1-2 ovate truncate long mucronate, fig. gls. 1-2 longer, rachilla produced beyond the upper, pales 2 not keeled.

SINGAPORE, Ridley S. Feilding.

Leaves smooth above except the marginal nerves, scaberulous beneath, base rounded, petiole short broad, midrib slender, nerves 10-12 pairs; sheath short, smooth, striate, callus narrow. Spike or spicate panule 3-4 m, terminating a leafy branchlet; heads subdistichous, bracteate; bracts with imperfect blades, ovate, truncate, fimbriate. Spikelets several sterile, few fertile; outer palea narrow, convolute, bimucronate, tip harry, inner shorter tip rounded glabrous. Lodicules 6-10, many nerved, entire or forked. Stamens 6, 3 longer obtuse, 3 shorter acute. Ovary linear; style long embraced by the enlarged perigynium, stigma plumose.

#### Flowers unknown.

7. O. setigera, Gamble Bamb Brit. Ind. 128, t. 115; stem-sheaths papery sparsely strigose narrowed to a truncate top, blade subulate hairlike, leaves 6-9 by  $\frac{3}{4}$ - $1\frac{1}{4}$  in. oblanceolate acuminate puberulous beneath, sheath smooth, auricles decurrent, ligule very narrow erose.

NILGHIRI HILLS; rayines above Gudelur, alt. about 3000 ft., Gamble.

A small tufted erect or straggling need-like Bamboo. Stem 20 ft. by  $\frac{1}{2} - \frac{2}{3}$  in. diam., naked below, nodes hardly swollen; internodes 10-12 in, very smooth, walls 10-1 in. thick. Stem-sheaths 6-7 in., persistent tessellately wrinkled towards the top, blade 3-1 in., hairy within, margins incurved, top very narrow; blade 3-1 in., hairy within, margin incurved. Leaves smooth above, puberulous beneath, tip capillary, midrib narrow, nerves 6-7 pairs, tessellate by pellucid glands; auricles of sheath fringed with long curved bristles.

## ADDITIONS AND CORRECTIONS TO VOL. VII.

p. 4.	After 41. ARTHRAXON, insert:  Spikes solitary, rachis flattened, spikelets of each pair both 2-fld. and bisexual 41 <sup>1</sup> . ISCHNOCHLOA.
p. 5.	After 52 Germainia, insert: Spike solitary, joints clavate hollow, spikelets secund 2-nate lower 1-fld., upper neuter . 521. Coelaetheon.
,,	After 55. ISEILEMA, insert: Spikelets as in Anthestria but lower in spike not whorled and neuter
,,	For Subtribe VI. read Tribe VI.
,,	66. Phippsia, see Catabrosa himalaica, p. 311.
p. 6.	After 67. CYATHOPUS, insert: Spikelets compressed, fis. diandrous, gls. 1-nerved, III 2-lobed awned in the sinus 671. WOODROVIA.
,,	Subtribes Arrew and Evavenew are distinguished from one another by the very inconstant characters of the rachilla, which in Arra caryophyllea is produced with a minute seta beyond the fl. gl.
,,	After 83. Danthonia, insert: Spikelets of Danthonia, but lodicules 0, style single very long 831. Duthiea.
p. 7.	After 97. Phragmitis, insert: Rachilla elongate bearded, lateral nerves only of fig. gls. with long silky hairs
,,	103. CATABROSA. This genus includes 66. PHIPPSIA and 119. COLPODIUM, the position of which latter it should occupy on p. 8.
p. 8.	The characters of 105. MYRIOSTACHYS and 106. HALOPYRUM are partly transposed and erroneous; read:  Infl. pyramidal dense-fid., empty gls. long- awned, grain ovoid 105. MYRIOSTACHYS.  Infl. a lax panicle, empty gls. not awned, I 3- nerved, grain broad deeply concave ventrally 106. HALOPYRUM.
,,	Dele 107. COELACHYRUM (see p. 328).
,,	119. Colpodium, see p. 311 under Catabrosa.
,,	For DUTHIEA read DUTHIEA, and transfer to p. 6 after 83. DANTHONIA.
p. 9.	After Elymus, insert: Spikelets 2- or more-fid., empty gls. 0 or minute 131 <sup>1</sup> . Asperella.

p. 100. Under COIX LACHEYMA-JOBI, var. stenocarpa, after Stapf. insert: "in Hook. Ic. Pl. t. 1764, in Kew Bulletin (1888) 144."

" Under var. Ma-yuen, insert as synonym, C. gigantea, Kew Bulletin (1893) 76.

p. 99. In character of Zoysia, line 5, dele "nerveless"; line 6, the palea is not

135. For THYESACANTHUS, read THYESOSTACHYS.

always nerveless.

- p. 167. Under habitats for A. fastigiatus, for Berar, read Behar.
- p. 186. For Subgen. VI., read Subgen. VII.
- p. 187. " VII., " VIII.
- p. 203, line 8 from bottom, for criophorus, read eriophorus.
- p. 272. In generic character of Aira, the rachilla is described as not produced beyond gl. IV, but it is so in A. caryophyllea as a very minute setiform process.
- p. 282. For 84. DUTHIEA, read 831. DUTHIEA.
- p. 311, line 8 from top, for  $\frac{1}{3}$ , read  $\frac{1}{30}$ .
  - ., ., 14 ,, for augusta, read angusta.
- p. 312, line 9 from top, for Graphaphorum, read Graphephorum.
  - , 13, dele sheaths of innovations . . . to mouth.
  - ,, Under 6. C. Wallichii, for 10, read 1.
- p. 357, line 6, Festuca filiformis, Nees, is correctly referred to Tripogon abyssinicus at p. 287.

GENERAL INDEX.

# GENERAL INDEX.\*

Orders, suborders, tribes and sections in capital type; genera and species in roman type; synonyms and species incidentally mentioned in italic type.

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